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Experimental Flying Squid Fishery off British Columbia, 1987

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ABSTRACT

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Experimental fishing for flying squid (Ommastrephes bartrami) was continued in 1987 from both a Japanese vessel and a Canadian vessel in northeastern Pacific Ocean waters off the coast of British Columbia. Average squid catch rates (383 kg km^{-1}) for the Japanese vessel was the highest obtained over the 3-yr experimental study period. Pomfret and blue shark remained the major bycatch species, but as in 1986, marine mammal catch rate increased substantially over the previous year's level. A total of 90 marine mammals were caught by the two vessels combined, and while the average length of net required to catch one mammal was similar for the Canadian vessel over the past two years, catch rate increased (i.e., the average net length required to catch one mammal decreased) for the Japanese vessel in 1987.

RÉSUMÉ

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La pêche expérimentale du calmar Ommastrephes bartrami a été poursuivie en 1987. Elle a été réalisée à partir d'un bateau japonais et d'un bateau canadien dans le eaux du nord-est de l'océan Pacifique, au large de la côte de la Colombie-Britannique. Le taux moyen de capture de calmar (383 kg•km^{-1}) du bateau japonais a été le plus élevé obtenu au cours de la période d'étude expérimentale de trois ans. La castagnole et le requin bleu sont demeurés les principales espèces accessoires capturés, mais comme en 1986, le taux de capture de mammifères marins a augmenté de façon substantielle par rapport à l'année précédente. Les deux bateaux ont capturé, au total, 90 mammifères marins. La longueur moyenne de filet nécessaire pour capturer un mammifère a été similaire pour le bateau canadien au cours des deux dernières années, mais le taux de capture a augmenté (c.-à-d. que la longueur moyenne du filet nécessaire pour capturer un mammifère a diminué) pour le bateau japonais en 1987.

INTRODUCTION

Experimental fishing for flying squid (Ommastrephes bartrami) in 1987 was conducted from both a Japanese and a Canadian vessel in northeastern Pacific waters. Fishing was primarily off the coast of British Columbia, and to a lesser extent off Oregon and Washington outside the American 200-mile (320 km) Extended Economic Zone (EEZ). Experimental fishing off Canada has been conducted since 1979 (Bernard 1980), with more extensive investigation of fishing performance and bycatch characteristics conducted during the 1980s (Robinson and Jamieson 1984, Sloan 1984, Jamieson and Heritage 1987). Results indicate that flying squid abundance in the outer portion of the Canadian 320 km EEZ and immediately beyond is sufficient to support commercial fishing, but because available data do not allow estimation of total squid abundance, full fishery potential remains to be determined. It is not clear how large the sustainable catch might be, and as a result, how many vessels might potentially participate.

Experimental fishing to date has used drift gillnets, although some limited jigging was conducted in 1987 by the TOMI MARU #88. This report presents the daily fishing results and a general analysis of the 1987 data for the third year of a study designed to document and evaluate the nature of the catch associated with limited fishing of a commercial nature. Harvest rates over the course of a season are established, with particular emphasis on the nature of the bycatch. This report does not include detailed biological information on the species caught nor an interpretive analysis of fishing in relation to observed oceanographic parameters. These will be discussed in later reports.

METHODS

The same procedures described by Jamieson and Heritage (1987) were used in monitoring the 1987 squid fishery. Vessels participating in 1987 were the TOMI MARU #88 and the OCEAN PEARL, previously described in Sloan (1984) and Jamieson and Heritage (1987), respectively. Fishing by the OCEAN PEARL began on June 13 and finished on August 5. The TOMI MARU #88 began fishing on June 15 and terminated fishing on August 24.

Fishing began off the coast of northern California outside the American EEZ and quickly moved north into Canadian waters as surface water temperatures increased (Figs. 1-2). A total of 66 and 49 sets were made by the TOMI MARU #88 and OCEAN PEARL, respectively, and average net lengths fished by each vessel were 46.7 km and 28.4 km, respectively.

Each net group fished by the TOMI MARU #88 consisted of 160, 50 m tans of green 8 gauge monofilament with stretched mesh sizes from 115-121 mm. One of the 8 net groups had 20 consecutive tans (115 mm mesh) with 2 meshes of hollow core 3-thread filament woven into the 80 mesh deep net at meshes 39 and 40. The rationalle for this modification was that air trapped inside the thread might improve detection of the net by marine mammals by presenting stronger acoustic feedback, resulting in a possible reduction of the marine mammal bycatch. The net group containing this 1 km of hollowcore net was fished on 17 nights.

The OCEAN PEARL fished up to 6 net groups, each consisting of up to 120, 50 m tans with no hollow core filaments and stretched mesh sizes from 118-121 mm.

The TOMI MARU #88 and the OCEAN PEARL generally fished the same area each night, with their nets deployed in an east-west direction and about 5° apart in latitude. Fishing areas usually changed on a nightly basis, and were determined by water temperature and recent fishing experience.

Limited jigging was also carried out by the TOMI MARU #88, which was equipped with 4 jiggers (2 automatic and 2 manual) midships on its starboard side (Fig. 3). Jigging was conducted on 19 nights between June 15 and July 23 in the time interval between drift net deployment and retrieval. Each line had 26, forest green, 11 cm jigs on it. Conventional 10 cm squid jigs have 2 circular arrays of 10 mm long, unbarbed hooks facing upwards, but the jigs used in this study had lower and upper arrays of 15 and 12 mm long, unbarbed hooks, respectively. The larger size of both the jig itself and the hooks was justified because of the relatively large size of the squid being fished (average weight caught in the nets was 2.34 kg).

RESULTS

DRIFT GILLNET FISHING

Species caught during the 1987 experimental flying squid fishery are listed in Table 1, with their estimated or measured average weights given in Table 2. Proportion of the major bycatch species in the total catch (Table 3) differed between the two vessels, as in 1986, with the TOMI MARU #88 catching more blue shark than pomfret by weight, and the OCEAN PEARL showing the converse. However, this difference was not statistically significant (t-test, $p>.05$). For both vessels, the bycatch proportion by weight of pomfret increased substantially over that in 1986 (Jamieson and Heritage 1987): from 3.3% in both 1985 and 1986 to 10.6% in 1987 for the TOMI MARU #88, and from 2.1% in 1986 to 10.7% in 1987 for the OCEAN PEARL. Blue shark catch proportion remained relatively constant (about 14%) over this time interval

for the TOMI MARU #88 but increased from 1.8% in 1986 to 9.9% in 1987 for the OCEAN PEARL. The net result was a decrease in 1987 in the percentage of the catch represented by squid: from 79% to 71% for the TOMI MARU #88, and from 85% to 73% for the OCEAN PEARL.

All remaining species combined accounted for 3.4% and 6.5% by weight of the catches of the TOMI MARU #88 and OCEAN PEARL, respectively. By weight, the third major bycatch species was salmon shark and jack mackerel for the TOMI MARU #88 and OCEAN PEARL, respectively, whereas by piece, it was jack mackerel for both vessels.

Daily driftnet catches by both vessels are given in Table 4. Marine mammal bycatch (Table 5) showed the basic pattern established in previous years, with the main species caught being Dall porpoise (58 animals). Pacific white-sided dolphins (16 animals) were the next most common marine mammal caught. Catch rate, expressed as average net length required to catch one marine mammal, was again higher (i.e., less net was required to catch a mammal) for the OCEAN PEARL than for the TOMI MARU #88, although this difference was less in 1987 than in previous years. The marine mammal catch rate of the OCEAN PEARL in 1987 was similar to its rate in 1986, whereas the mammal catch rate of the TOMI MARU #88 significantly increased in 1987 over that in previous years.

Catch per unit effort (CPUE), expressed as either pieces or weight (kg) per 10 km of net fished (Tables 7 and 8, respectively), is provided for each species fished. Average CPUE for squid (Table 7a) decreased by 8% for the OCEAN PEARL between 1986 and 1987, whereas for the TOMI MARU #88, it increased by 41%, and was the highest obtained by any of the vessels fishing off British Columbia over the past 3 years (Table 9).

The above results are averages for the full fishing season by each vessel, and it should be noted that considerable daily variation was observed over the approximately 2-month fishing period (Table 4a,c). In particular, there were significant differences (ANOVA) in CPUE of some species caught before and after July 24 (Table 10); surface water temperature was generally above 14°C in this latter time period. This was particularly evident for the bycatch of marine mammals by the TOMI MARU #88, with 42 mammals caught in the first 38 nights of fishing (June 15-July 24) and 4 mammals caught in the last 28 nights of fishing (July 25-August 24). For the TOMI MARU #88, squid CPUE was 31% higher after July 24. With other major bycatch species, average CPUE of pomfret, albacore, blue shark and salmon shark increased after August 24, while catches of jack mackeral, salmon and steelhead decreased. Pomfret CPUE was 34% greater. A similar pattern was observed for the OCEAN PEARL, but the relative change in CPUE of flying squid and pomfort, the two major species caught, before and after July 24 by this vessel was significant, in contrast to no significant differences in the catch rates of these species by the TOMI MARU #88.

JIG FISHING

Jig fishing results for each night are given in Table 4b, and it is evident that jigging, as conducted by the TOMI MARU #88 in this study, yielded few flying squid. The maximum squid catch per night was 31 squid, and a total of only 40 squid were caught during 19 nights of jigging. Thus, an insufficient number of squid were caught to allow any catch pattern to be evaluated.

DISCUSSION

As in previous years, the CPUE of flying squid was sufficiently high to allow profitable driftnet fishing. However, this positive statement is compromised by the substantial, discarded bycatch associated with driftnet fishing, and in particular by the significant increase in marine mammal bycatch over the past two years. The concerns associated with this bycatch have been previously discussed by Jamieson and Heritage (1987), and it is evident that with both the gear and fishing protocol currently being employed, avoidence of at least some bycatch is impossible. Reasons why the bycatchs of some species, notably marine mammals, have fluctuated so much over the past 3 years are not apparent at this time. Fishing technique has not varied in any obvious way, and so this may indicate a change in total abundance within the study area.

The suggestion by Jamieson and Heritage (1987) that mammals might be becoming accidently entangled as they tried to eat fish caught in the driftnets now appears unlikely, as observation of the stomach contents (D. McFarlane and A. Anaka, pers. comm.) of some of the mammals caught show no evidence of remains of species caught in the driftnets. This strengthens the argument that marine mammals are simply blundering into the net, and are apparently often unable to detect its presence and avoid it.

Four primary options exist to deal with the bycatch issue:

(1) terminate the current driftnet fishery;
(2) further investigate fishing methods which have no bycatch (e.g. jigging);
(3) develop new fishing procedures, which while perhaps not eliminating a bycatch completely, will significantly reduce it for at least some specified species;
(4) establish the level of catch for each bycatch species which might be removed without detrimentally affecting the status of that species' stock, and regulate fishing of flying squid so that bycatches do not exceed the designated maximum levels for any specified species.

The option, or combination of options, chosen to deal with possible future continuation of the driftnet squid fishery will be determined following consideration of factors relating to biology, economics, available research resources, and social concerns.

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Table 1. Scientific and common names of all species caught during 1987 offshore squid fisheries.

Ommastrephes bartrami	Flying Squid
Onychoteuthis borealijaponica	Nail Squid
Ocythoe tuberculata	Pelagic Octopus
Oncorhynchus gorbuscha	Pink Salmon
Oncorhynchus keta	Chum Salmon
Oncorhynchus kisutch	Coho Salmon
Oncorhynchus nerka	Sockeye Salmon
Salmo gairdneri	Steelhead
Isurus oxyrinchus	Bonito Shark
Prionace glauca	Blue Shark
Lamna ditropis	Salmon Shark
Alopias vulpinus	Thresher Shark
Cetorhinus maximus	Basking Shark
Galeorhinus zyopterus	Soupfin Shark
Dasyatis violacea	Pelagic Stingray
Brama japonica	Pomfret
Taractes asper	Rough Pomfret
Thunnus alalunga	Albacore
Trachurus symmetricus	Jack Mackerel
Scomber japonicus	Chub Mackerel
Seriola lalandi	Yellowtail
Pentaceros richardsoni	Pelagic Armourhead
Erilepis zonifer	Skilfish
Cololabis saira	Pacific Saury
Mola mola	Ocean Sunfish
Alepisaurus ferox	Longnose Lancetfish
Phocoenoides dalli	Dall Porpoise
Lissodelphis borealis	Northern Right-whale Dolphin
Lagenorhynchus obliquidens	Pacific White-Sided Dolphin
Globicephala macrorynchus	Short-finned Pilot Whale
Phocoena phocoena	Harbour Porpoise
Callorhinus ursinus	Northern Fur Seal
Eumetopias jubatus	Stellar Sea Lion
Family Diomedeidae	Albatrosses
Puffinus tenuirostris	Slender-billed Shearwater
Puffinus priseus	Sooty Shearwater
Family Oceanitidae	Storm-petrels
Family Alcidae	Murres, Murrelets, Aukletes and Puffins
Uria aagle	Common Murre
Ptychoramphus aleuticus	Cassin's Auklette
Cerorhinca monocerata	Rhinoceros Auklette
Subfamily Sterninae	Terns

Table 2. Estimated average weights and measured average weights (in kilograms) for all species caught and killed by the TOMI MARU No. 88 and the OCEAN PEARL in 1987.

	Average weight (kg)			
	Estimated			Measured
		TOMI MARU		
Common name		Net	Jig	OCEAN PEARL
Flying Squid	2.28	2.33	1.77	2.34
Pelagic Octopus	1.00	1.00	-	1.00
Unidentified Squid	1.00	1.00	-	-
Nail Squid	1.00	1.00	-	3.00
Pink Salmon	1.08	1.01	-	1.28
Chum Salmon	2.31	1.99	-	3.57
Coho Salmon	2.25	2.00	-	3.00
Sockeye Salmon	1.39	1.20	-	3.17
Steelhead	1.96	1.90	-	4.10
Bonito Shark	36.00	25.00	-	-
Blue Shark	4.99	5.49	-	4.18
Salmon Shark	24.88	28.78	-	22.71
Thresher Shark	260.00	122.50	-	196.67
Basking Shark	2500.00	-	-	2500.00
Soupfin Shark	1.00	-	-	20.00
Pelagic Stingray	1.00	2.00	-	-
Pomfret	2.34	2.34	-	1.08
Rough Pomfret	2.34	-	-	1.00
Albacore	5.74	4.90	-	6.62
Jack Mackerel	2.40	2.41	-	2.68
Chub Mackerel	0.30	-	-	2.00
Pacific Bonito	1.00	38.00	-	-
Yellowtail	4.00	2.29	-	2.00
Pelagic Armourhead	0.37	0.37	-	0.86
Skilfish	0.50	0.75	-	1.00
Pacific Saury	0.07	-	-	0.50
Long Nose Lancetfish	2.00	2.83	-	5.00
Ocean Sunfish	28.00	7.00	-	-
Unidentified Fish	1.00	1.00	-	-

Table 2 (cont'd)

Common name	Average weight (kg) Estimated	TOMI MARU Net	TOMI MARU Jig	Measured OCEAN PEARL
Dall Porpoise	148.00	148.00	-	148.00
Northern Right Whale Dolphin	182.00	182.00	-	182.00
Pacific White-Sided Dolphin	136.00	136.00	-	136.00
Short-finned Pilot Whale	2283.00	2283.00	-	2283.00
Harbour Porpoise	50.00	50.00	-	50.00
Fur Seal	34.00	34.00	-	-
Stellar Sea Lion	300.00	-	-	300.00
Unidentified mammal	1.00	1.00	-	-
Albatross	5.00	5.00	-	5.00
Sooty Shearwater	0.74	0.74	-	0.74
Slender-billed Shearwater	0.74	-	-	0.74
Storm Petrels	0.10	0.10	-	0.10
Cassin's Auklet	0.20	0.20	-	0.20
Rhinoceros Auklet	0.26	0.26	-	-
Common Murre	0.90	0.90	-	-
Murres, Murrelets, Auklets and Puffins	0.40	-	-	0.40
Terns	0.20	0.20	-	0.20

Table 3a. Total catch by species and the proportion of the total catch represented by each species for the 1987 TOMI MARU NO.88 offshore squid cruise (* = estimated; 0.00 = rounded number <0.01).

Species	Kg	Percent	Pieces	Percent
Flying Squid	1 180 074	71.30	507 360*	79.84
Nail Squid	1*	0.00	1	0.00
Unidentified Squid	3*	0.00	3	0.00
Pelagic Octopus	5*	0.00	5	0.00
Pink Salmon	11*	0.00	11	0.00
Chum Salmon	201	0.01	101	0.02
Coho Salmon	14	0.00	7	0.00
Sockeye Salmon	57*	0.00	47	0.01
Steelhead	520*	0.03	273	0.04
Bonito Shark	100	0.01	4	0.00
Blue Shark	243 363	14.70	44 300	6.97
Salmon Shark	23 429	1.42	814	0.13
Thresher Shark	735*	0.04	6	0.00
Pelagic Stingray	2	0.00	1	0.00
Pomfret	175 438	10.60	74 943*	11.79
Albacore	5 021	0.30	1 025*	0.16
Jack Mackerel	14 558	0.88	6 048*	0.95
Pacific Bonito	76	0.00	2	0.00
Yellowtail	55*	0.00	24	0.00
Pelagic Armourhead	8*	0.00	21	0.00
Skilfish	3*	0.00	4	0.00
Long Nose Lancetfish	17*	0.00	6	0.00
Ocean Sunfish	7	0.00	1	0.00
Unidentified Fish	1*	0.00	1	0.00
Dall Porpoise	4 736*	0.29	32	0.01
Northern Right-Whale Dolphin	1 274*	0.08	7	0.00
Pacific White-Sided Dolphin	408*	0.02	3	0.00
Short-finned Pilot Whale	4 566*	0.28	2	0.00
Fur Seal	34*	0.00	1	0.00
Unidentified Mammal	1*	0.00	1	0.00

Table 3a (cont'd)

Species	Kg	Percent	Pieces	Percent
Albatross	10*	0.00	2	0.00
Sooty Shearwater	272*	0.02	368	0.06
Storm Petrels	3*	0.00	32	0.01
Cassin's Auklet	4*	0.00	22	0.00
Rhinoceros Auklet	1*	0.00	2	0.00
Common Murre	1*	0.00	1	0.00
Terns	5*	0.00	23	0.00
Total kg		1 655 013		
Total pieces		635 504		
Number of species present		37		

Table 3b. Total catch by species and the proportion of the total catch represented by each species for the 1987 OCEAN PEARL offshore squid cruise (*=estimated; 0.00=rounded number <0.01).

Species	Kg	Percent	Pieces	Percent
Flying Squid	347 402	72.95	148 243	70.10
Nail Squid	3	0.00	1	0.00
Pelagic Octopus	5*	0.00	5	0.00
Pomfret	50 721	10.65	46 913	22.18
Rough Pomfret	1	0.00	1	0.00
Pink Salmon	37	0.01	29	0.01
Chum Salmon	225	0.05	63	0.03
Coho Salmon	3	0.00	1	0.00
Sockeye Salmon	1 258	0.26	397	0.19
Steelhead	611	0.13	149	0.07
Blue Shark	47 254	9.92	11 295	5.34
Salmon Shark	5 677	1.19	250	0.12
Thresher Shark	590	0.12	3	0.00
Basking Shark	2 500*	0.52	1	0.00
Soupfin Shark	20	0.00	1	0.00
Albacore	1 052	0.22	159	0.08
Jack Mackerel	10 150	2.13	3 794	1.79
Chub Mackerel	8	0.00	4	0.00
Yellowtail	2	0.00	1	0.00
Pelagic Armourhead	6	0.00	7	0.00
Skilfish	1	0.00	1	0.00
Pacific Saury	1	0.00	2	0.00
Long Nose Lancetfish	10	0.00	2	0.00
Dall Porpoise	3 848*	0.81	26	0.01
Northern Right-Whale Dolphin	364*	0.08	2	0.00
Pacific White-Sided Dolphin	1 768*	0.37	13	0.01
Short-finned Pilot Whale	2 283*	0.48	1	0.00
Harbour Porpoise	50*	0.01	1	0.00
Stellar Sea Lion	300*	0.06	1	0.00

Table 3b (cont'd)

Species	Kg	Percent	Pieces	Percent
Albatross	20*	0.00	4	0.00
Sooty Shearwater	71*	0.01	96	0.05
Slender-billed Shearwater	1*	0.00	1	0.00
Storm Petrels	0*	0.00	1	0.00
Cassin's Auklet	1*	0.00	6	0.00
Murre, Auklets and Puffins	1*	0.00	2	0.00
Terns	0*	0.00	2	0.00
Total kg		476 244		
Total pieces		211 478		
Number of species present		36		

Table 4a. Bridge log and drift net catch information, in pieces, for each night's fishing by the TOMI MARU NO.88 in 1987. * = estimated, LST = Local Standard Time.

SET NO.	1	2	3	4	5	6
DATE	JUNE 15	JUNE 16	JUNE 17	JUNE 18	JUNE 19	JUNE 20
TIME START (LST)	1700	1825	1700	1700	1650	1745
DURATION(HR.MIN)	11.00	9.35	11.00	11.00	11.10	10.45
START N. LAT. (DEG)	42	41	42	43	44	44
(MIN)	22.0	36.7	57.0	32.0	33.0	59.0
W. LONG. (DEG)	131	131	132	130	129	129
(MIN)	54.0	1.5	2.0	45.0	51.0	54.0
DIRECTION (DEG.TRUE)	090	090	090	090	290	270
FINISH N. LAT. (DEG)	42	41	42	43	44	44
(MIN)	22.0	36.8	58.0	32.0	43.0	59.3
W.LONG. (DEG)	131	130	131	130	130	130
(MIN)	11.0	39.8	29.0	11.0	22.0	19.3
LENGTH OF SET KM.	56.0	28.0	42.0	42.0	42.0	28.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	14.0	14.4	14.2	13.8	13.5	13.2
END TEMP.(DEG.C)	14.0	14.6	14.9	14.6	13.4	12.5
NO. OF GROUPS.	8	4	6	6	6	4
TOTAL SQUID (KG)	1409	876	914	1066	1447	4609

Table 4a (cont'd)

SET NO.	1	2	3	4	5	6
DATE	JUNE 15	JUNE 16	JUNE 17	JUNE 18	JUNE 19	JUNE 20
TOTAL CATCH PIECES	2451*	1668*	839*	1312*	1593*	2327*
TOTAL CATCH WEIGHT	6776	4874	2881*	4299*	5303	5540
INVERTEBRATES						
FLYING SQUID	730	384*	400*	467*	634*	2021*
PELAGIC OCTOPUS	..	..	..	..	..	..
UNIDENT. SQUID	..	..	2	..	..	..
FISH						
POMFRET	71*	63*	6*	13*	45*	47*
JACK MACKEREL	11*	122*	..	11*	7*	11*
ALBACORE	..	1	2	..	..	..
STEELHEAD	..	..	..	..	..	..
CHUM SALMON	1	..	..	..	..	..
SOCKEYE SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	..	2	..	..
PELAGIC ARMOURHEAD	..	..	4	..	..	..
PINK SALMON	..	..	..	..	..	..
COHO SALMON	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
SKILFISH	..	..	1	..	..	..
PACIFIC BONITO	..	..	..	..	..	..
OCEAN SUNFISH	..	..	..	1	..	..
UNIDENT. FISH	..	..	..	..	..	..
SELACHI						
BLUE SHARK	1620	1080	420	810	903	243
SALMON SHARK	18	18	3	6	4	5
THRESHER SHARK	..	..	..	..	..	..
BONITO SHARK	..	..	..	..	..	..
PELAGIC STINGRAY	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	..	..	..	1	..	..
N.RT.-WHALE DOLPHIN	..	..	1	..	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
FUR SEAL	..	..	..	..	..	..
STENELLA SP	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	..	..	..	1	..	..
STORM PETRELS	..	..	..	..	..	..
TERNS	..	..	..	..	..	..
CASSIN'S AUKLET	..	..	..	..	..	..
ALBATROSS	..	..	..	..	..	..
RHINOCEROS AUKLET	..	..	..	..	..	..
COMMON MURRE	..	..	..	..	..	..

Table 4a (cont'd)

SET NO.	7	8	9	10	11	12
DATE	JUNE 21	JUNE 22	JUNE 23	JUNE 24	JUNE 25	JUNE 26
TIME START (LST)	1700	1655	1650	1700	1655	1945
DURATION(HR.MIN)	10.00	10.35	10.40	10.45	10.35	9.15
START N. LAT. (DEG)	45	45	45	45	45	46
(MIN)	10.0	14.1	17.0	31.7	15.3	1.7
W. LONG. (DEG)	130	130	130	130	130	130
(MIN)	21.0	51.9	38.8	24.0	35.7	31.1
DIRECTION (DEG.TRUE)	080	090	090	080	090	090
FINISH N. LAT. (DEG)	45	45	45	45	45	46
(MIN)	15.0	14.4	12.2	32.1	14.9	1.2
W.LONG. (DEG)	129	130	129	129	129	130
(MIN)	35.0	5.2	51.0	43.9	30.0	0.7
LENGTH OF SET KM.	56.0	56.0	56.0	49.0	56.0	35.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	12.3	12.7	12.6	13.8	13.3	13.8
END TEMP.(DEG.C)	13.1	12.9	13.2	14.0	13.5	13.3
NO. OF GROUPS.	8	8	8	7	8	5
TOTAL SQUID (KG)	13529	21561	13333	7886	11314	7010

Table 4a (cont'd)

SET NO.	7	8	9	10	11	12
DATE	JUNE 21	JUNE 22	JUNE 23	JUNE 24	JUNE 25	JUNE 26
TOTAL CATCH PIECES	6262*	9689*	6109*	4039*	5741*	3500*
TOTAL CATCH WEIGHT	14580*	22467*	16957*	9956*	14245*	8395*
INVERTEBRATES						
FLYING SQUID	5933*	9456*	5847*	3458*	4962*	3074*
PELAGIC OCTOPUS	1	..	..	..	..	..
UNIDENT. SQUID	..	..	..	..	..	..
FISH						
POMFRET	43*	29*	47*	239*	258*	239*
JACK MACKEREL	44*	15*	15*	15*	..	..
ALBACORE	1	..	..	..	..	..
STEELHEAD	..	..	1	1	..	3
CHUM SALMON	..	..	1	..	1	..
SOCKEYE SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	..	..	..	..
PELAGIC ARMOURHEAD	..	1	..	..	..	..
PINK SALMON	1	..	..	..	1	..
COHO SALMON	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	2	..
SKILFISH	..	..	..	..	..	..
PACIFIC BONITO	..	..	..	..	..	..
OCEAN SUNFISH	..	..	..	..	..	..
UNIDENT. FISH	..	..	..	..	..	..
SELACHI						
BLUE SHARK	236	180	190	320	510	180
SALMON SHARK	2	6	5	2	3	3
THRESHER SHARK	..	..	..	..	..	..
BONITO SHARK	..	..	..	..	..	..
PELAGIC STINGRAY	..	..	..	1	..	..
MAMMALS						
DALL PORPOISE	..	1	1	1	..	..
N.RT.-WHALE DOLPHIN	..	..	1	..	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	1	..
PILOT WHALE	..	..	1	..	..	..
FUR SEAL	..	..	..	..	..	..
STENELLA SP	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	..	1	..	2	2	..
STORM PETRELS	..	..	..	..	1	..
TERNS	..	..	..	..	..	..
CASSIN'S AUKLET	..	..	..	..	..	1
ALBATROSS	1	..	..	..	..	..
RHINOCEROS AUKLET	..	..	..	..	..	..
COMMON MURRE	..	..	..	..	..	..

Table 4a (cont'd)

SET NO.	13	14	15	16	17	18
DATE	JUNE 27	JUNE 28	JUNE 29	JUNE 30	JULY 1	JULY 2
TIME START (LST)	1640	1705	1755	1755	1850	1705
DURATION(HR.MIN)	11.05	11.10	10.05	10.05	9.40	10.55
START N. LAT. (DEG)	46	46	46	46	46	46
(MIN)	13.5	15.4	27.0	28.0	31.0	32.0
W. LONG. (DEG)	131	132	132	132	130	130
(MIN)	50.0	5.0	17.0	16.0	55.9	52.0
DIRECTION (DEG.TRUE)	090	090	100	095	090	095
FINISH N. LAT. (DEG)	46	46	46	46	46	46
(MIN)	11.0	15.4	19.0	21.0	26.3	27.6
W.LONG. (DEG)	131	131	131	131	130	130
(MIN)	2.1	26.5	38.0	28.0	14.4	53.1
LENGTH OF SET KM.	56.0	49.0	49.0	56.0	49.0	56.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	13.0	12.9	12.8	12.7	13.2	13.5
END TEMP.(DEG.C)	13.0	12.8	12.4	12.7	12.9	13.3
NO. OF GROUPS.	8	7	7	8	7	8
TOTAL SQUID (KG)	14247	13940	14362	12076	27886	34819

Table 4a (cont'd)

SET NO.	13	14	15	16	17	18
DATE	JUNE 27	JUNE 28	JUNE 29	JUNE 30	JULY 1	JULY 2
TOTAL CATCH PIECES	10711*	9696*	7710*	6446*	13671*	16023*
TOTAL CATCH WEIGHT	25908*	22802*	18960*	15572*	32170*	37179*
INVERTEBRATES						
FLYING SQUID	6248*	6114*	6299*	5296*	12230*	15271*
PELAGIC OCTOPUS	..	..	..	..	..	1
UNIDENT. SQUID	..	..	..	..	..	..
FISH						
POMFRET	3897*	3076*	897*	811*	1111*	470*
JACK MACKEREL	..	..	..	..	..	..
ALBACORE	..	..	..	..	..	..
STEELHEAD	..	3	3	2	5	6
CHUM SALMON	..	2	5	3	4	..
SOCKEYE SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	..	..	..	..
PELAGIC ARMOURHEAD	1	2	2	3	..	..
PINK SALMON	1	1	1	..	..	..
COHO SALMON	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	1
SKILFISH	..	..	..	..	..	..
PACIFIC BONITO	..	..	..	..	..	..
OCEAN SUNFISH	..	..	..	..	..	..
UNIDENT. FISH	..	..	..	..	..	..
SELACHI						
BLUE SHARK	560	490	480	320	310	260
SALMON SHARK	3	6	21	6	6	10
THRESHER SHARK	..	..	..	..	..	..
BONITO SHARK	..	..	..	..	..	..
PELAGIC STINGRAY	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	..	..	..	..	..	..
N.RT.-WHALE DOLPHIN	..	..	..	1	1	..
P.WH.-SIDED DOLPHIN	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
FUR SEAL	..	..	..	..	..	..
STENELLA SP	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	..	..	2	3	3	2
STORM PETRELS	..	1	..	..	..	..
TERNS	..	..	..	..	..	..
CASSIN'S AUKLET	1	1	..	1	1	1
ALBATROSS	..	..	..	..	..	..
RHINOCEROS AUKLET	..	..	..	..	..	..
COMMON MURRE	..	..	..	..	..	1

Table 4a (cont'd)

SET NO.	19	20	21	22	23	24
DATE	JULY 3	JULY 4	JULY 5	JULY 6	JULY 7	JULY 8
TIME START (LST)	1835	1755	1830	1800	1915	1740
DURATION(HR.MIN)	10.15	10.35	10.00	10.00	9.45	10.50
START N. LAT. (DEG)	46	46	46	46	46	46
(MIN)	36.0	34.7	32.6	31.6	46.9	32.0
W. LONG. (DEG)	130	130	130	130	130	130
(MIN)	38.0	35.6	22.0	19.5	15.7	33.0
DIRECTION (DEG.TRUE)	090	090	090	090	285	090
FINISH N. LAT. (DEG)	46	46	46	46	46	46
(MIN)	36.3	34.5	32.6	31.5	53.7	32.0
W.LONG. (DEG)	129	129	129	129	130	129
(MIN)	55.9	54.2	40.2	43.4	55.7	49.0
LENGTH OF SET KM.	49.0	49.0	49.0	42.0	49.0	49.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	13.1	13.3	13.2	13.2	13.0	12.8
END TEMP.(DEG.C)	12.9	13.1	13.3	13.2	13.3	12.8
NO. OF GROUPS.	7	7	7	6	7	7
TOTAL SQUID (KG)	32723	35276	36495	5920	7542	14857

Table 4a (cont'd)

SET NO.	19	20	21	22	23	24
DATE	JULY 3	JULY 4	JULY 5	JULY 6	JULY 7	JULY 8
TOTAL CATCH PIECES	14839*	16094*	16661*	5507*	3978*	10786*
TOTAL CATCH WEIGHT	34597*	37326*	38719*	14017*	9502*	26733*
INVERTEBRATES						
FLYING SQUID	14352*	15471*	16006*	2596*	3307*	6516*
PELAGIC OCTOPUS	..	..	3	..	..	..
UNIDENT. SQUID	..	..	..	..	..	..
FISH						
POMFRET	307*	444*	470*	880*	324*	3803*
JACK MACKEREL	..	..	..	1677*	155*	4*
ALBACORE	..	..	..	..	..	..
STEELHEAD	..	1	1	1	..	9
CHUM SALMON	..	3	6	4	5	10
SOCKEYE SALMON	..	..	..	..	..	4
YELLOWTAIL	..	..	3	3	3	..
PELAGIC ARMOURHEAD	..	..	..	..	..	1
PINK SALMON	1	..	..	..	1	..
COHO SALMON	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	1	..	..
SKILFISH	..	..	..	..	..	..
PACIFIC BONITO	..	..	..	..	..	..
OCEAN SUNFISH	..	..	..	..	..	..
UNIDENT. FISH	..	..	..	..	..	..
SELACHI						
BLUE SHARK	160	160	140	306	170	420
SALMON SHARK	10	7	8	12	7	6
THRESHER SHARK	..	..	..	1	..	..
BONITO SHARK	..	..	..	..	..	..
PELAGIC STINGRAY	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	1	1	1	1	..	5
N.RT.-WHALE DOLPHIN	..	..	..	..	..	2
P.WH.-SIDED DOLPHIN	..	..	1	..	..	1
PILOT WHALE	..	..	..	..	..	..
FUR SEAL	..	..	..	..	..	..
STENELLA SP	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	8	5	14	21	5	5
STORM PETRELS	..	1	8	3	1	..
TERNS	..	..	..	..	..	..
CASSIN'S AUKLET	..	1	..	1	..	..
ALBATROSS	..	..	..	..	..	..
RHINOCEROS AUKLET	..	..	..	..	..	..
COMMON MURRE	..	..	..	..	..	..

Table 4a (cont'd)

SET NO.	25	26	27	28	29	30
DATE	JULY 9	JULY 10	JULY 11	JULY 12	JULY 13	JULY 14
TIME START (LST)	1735	2110	1725	1730	2000	2030
DURATION(HR.MIN)	10.25	9.20	11.20	11.00	10.00	9.45
START N. LAT. (DEG)	47	47	47	47	47	47
(MIN)	21.6	19.1	17.0	27.0	30.8	36.1
W. LONG. (DEG)	130	130	129	130	130	130
(MIN)	14.8	35.0	53.0	5.0	0.0	23.6
DIRECTION (DEG.TRUE)	090	090	090	090	295	110
FINISH N. LAT. (DEG)	47	47	47	47	47	47
(MIN)	20.2	18.5	21.0	31.0	24.9	27.8
W.LONG. (DEG)	129	129	129	130	129	129
(MIN)	35.3	36.6	50.0	1.0	51.3	56.7
LENGTH OF SET KM.	56.0	42.0	42.0	49.0	42.0	35.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	13.1	14.0	14.2	13.5	13.6	13.5
END TEMP.(DEG.C)	13.3	13.7	13.7	13.4	13.5	13.3
NO. OF GROUPS.	8	6	6	7	6	5
TOTAL SQUID (KG)	36533	16685	14628	26274	30133	16152

Table 4a (cont'd)

SET NO.	25	26	27	28	29	30
DATE	JULY 9	JULY 10	JULY 11	JULY 12	JULY 13	JULY 14
TOTAL CATCH PIECES	16558*	8063*	8057*	15034*	16336*	11029*
TOTAL CATCH WEIGHT	38588*	19661*	19578*	37555*	37724*	26067*
INVERTEBRATES						
FLYING SQUID	16023*	7317*	6415*	11523*	13216*	7084*
PELAGIC OCTOPUS	..	..	..	..	..	..
UNIDENT. SQUID	..	..	..	..	..	..
FISH						
POMFRET	380*	512*	1435*	3247*	2871*	2393*
JACK MACKEREL	..	..	88*	111*	129*	1458*
ALBACORE	..	..	..	..	..	..
STEELHEAD	8	3	5	10	8	11
CHUM SALMON	2	1	..	2	1	4
SOCKEYE SALMON	2	..	..	1	2	2
YELLOWTAIL	..	..	6	..	..	..
PELAGIC ARMOURHEAD	..	..	..	1	..	..
PINK SALMON	..	..	1	..	..	..
COHO SALMON	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	1	1	..	..
SKILFISH	..	..	2	..	..	..
PACIFIC BONITO	..	..	..	..	..	..
OCEAN SUNFISH	..	..	..	..	..	..
UNIDENT. FISH	..	..	..	..	..	..
SELACHI						
BLUE SHARK	120	210	86	110	96	39
SALMON SHARK	7	10	5	8	3	9
THRESHER SHARK	1	..	..	..	..	..
BONITO SHARK	..	..	..	..	..	..
PELAGIC STINGRAY	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	1	4	5	1	..	..
N.RT.-WHALE DOLPHIN	..	..	..	1	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	..	..
PILOT WHALE	..	..	..	1	..	..
FUR SEAL	..	1	..	..	..	..
STENELLA SP	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	13	4	4	15	10	28
STORM PETRELS	1	1	1	1	..	1
TERNS	..	..	..	..	..	..
CASSIN'S AUKLET	..	..	1	1	..	..
ALBATROSS	..	..	..	..	..	..
RHINOCEROS AUKLET	..	..	2	..	..	..
COMMON MURRE	..	..	..	..	..	..

Table 4a (cont'd)

SET NO.	31	32	33	34	35	36
DATE	JULY 15	JULY 18	JULY 19	JULY 20	JULY 21	JULY 22
TIME START (LST)	2030	1920	1645	1750	1910	1800
DURATION(HR.MIN)	9.00	9.40	11.15	11.10	9.50	11.00
START N. LAT. (DEG)	48	48	47	47	47	47
(MIN)	2.0	27.3	37.0	38.5	33.8	33.5
W. LONG. (DEG)	130	132	130	130	129	129
(MIN)	21.0	7.2	33.0	18.0	54.8	42.0
DIRECTION (DEG.TRUE)	110	110	110	100	100	100
FINISH N. LAT. (DEG)	47	48	47	47	47	47
(MIN)	58.0	21.9	29.0	32.4	28.0	31.4
W.LONG. (DEG)	130	131	129	129	129	129
(MIN)	10.0	53.1	44.0	35.7	14.8	0.8
LENGTH OF SET KM.	14.0	21.0	56.0	49.0	49.0	49.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	13.5	12.8	13.3	13.6	13.6	13.6
END TEMP.(DEG.C)	13.3	12.9	13.6	13.7	14.3	14.4
NO. OF GROUPS.	2	3	8	7	7	7
TOTAL SQUID (KG)	2991	2590	27542	26209	25867	13909

Table 4a (cont'd)

SET NO.	31	32	33	34	35	36
DATE	JULY 15	JULY 18	JULY 19	JULY 20	JULY 21	JULY 22
TOTAL CATCH PIECES	2234*	2156*	14078*	12333*	11930*	7459*
TOTAL CATCH WEIGHT	5412*	5110*	33037*	29565*	28214*	17091*
INVERTEBRATES						
FLYING SQUID	1311*	1135*	12079*	11495*	11345*	6100*
PELAGIC OCTOPUS	..	..	..	..	..	..
UNIDENT. SQUID	..	1	..	..	..	..
FISH						
POMFRET	470*	897*	1623*	222*	205*	1196*
JACK MACKEREL	420*	66*	199*	170*	12*	129*
ALBACORE	..	..	80	105	62	9
STEELHEAD	7	15	21	13	13	6
CHUM SALMON	3	..	3	..	2	2
SOCKEYE SALMON	3	7	2	1	..	1
YELLOWTAIL	..	..	..	..	..	..
PELAGIC ARMOURHEAD	..	..	..	1	..	..
PINK SALMON	..	..	..	..	..	..
COHO SALMON	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
SKILFISH	..	..	..	..	..	..
PACIFIC BONITO	..	..	..	..	..	..
OCEAN SUNFISH	..	..	..	..	..	..
UNIDENT. FISH	..	..	..	..	..	..
SELACHI						
BLUE SHARK	16	26	60	310	270	..
SALMON SHARK	2	4	8	9	8	..
THRESHER SHARK	..	..	..	1	..	..
BONITO SHARK	..	..	..	..	..	..
PELAGIC STINGRAY	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	1	..	2	..	..	..
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
FUR SEAL	..	..	..	..	..	..
STENELLA SP	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	..	..	..	4	9	13
STORM PETRELS	1	2	..	2	3	2
TERNS	..	3	..	..	..	..
CASSIN'S AUKLET	..	..	..	..	1	1
ALBATROSS	..	..	..	..	..	..
RHINOCEROS AUKLET	..	..	..	..	..	..
COMMON MURRE	..	..	..	..	..	..

Table 4a (cont'd)

SET NO.	37	38	39	40	41	42
DATE	JULY 23	JULY 24	JULY 25	JULY 26	JULY 27	JULY 28
TIME START (LST)	1700	1755	1655	1930	1805	1730
DURATION(HR.MIN)	11.00	10.05	11.05	9.30	10.05	10.30
START N. LAT. (DEG)	47	48	48	48	48	48
(MIN)	42.6	21.7	25.9	32.4	37.9	14.1
W. LONG. (DEG)	129	129	130	129	129	130
(MIN)	30.6	35.5	48.6	50.8	25.0	2.9
DIRECTION (DEG.TRUE)	095	270	090	090	090	270
FINISH N. LAT. (DEG)	47	48	48	48	48	48
(MIN)	39.6	22.9	26.3	33.1	37.9	13.3
W.LONG. (DEG)	128	130	130	129	128	130
(MIN)	42.6	23.7	1.7	6.4	54.2	52.6
LENGTH OF SET KM.	56.0	56.0	56.0	49.0	56.0	56.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	14.0	13.6	14.5	14.1	14.1	14.3
END TEMP.(DEG.C)	14.6	14.0	14.6	14.3	14.2	14.1
NO. OF GROUPS.	8	8	8	7	8	8
TOTAL SQUID (KG)	8685	15542	9638	23542	12876	32266

Table 4a (cont'd)

SET NO.	37	38	39	40	41	42
DATE	JULY 23	JULY 24	JULY 25	JULY 26	JULY 27	JULY 28
TOTAL CATCH PIECES	7822*	8408*	5706*	11924*	6198*	16040*
TOTAL CATCH WEIGHT	19115*	20483*	13826*	29221*	14752*	38644*
INVERTEBRATES						
FLYING SQUID	3809*	6816*	4227*	10325*	5647*	14530
PELAGIC OCTOPUS	..	..	..	..	..	..
UNIDENT. SQUID	..	..	..	..	..	..
FISH						
POMFRET	3675*	1196*	1324*	1111*	410*	470*
JACK MACKEREL	83*	45*	12*	..	..	12*
ALBACORE	7*	9	..	..	2	1
STEELHEAD	12	16	22	14	8	..
CHUM SALMON	2	3	2	9	..	2
SOCKEYE SALMON	..	4	2	11	4	..
YELLOWTAIL	..	..	..	..	..	..
PELAGIC ARMOURHEAD	..	..	..	..	..	..
PINK SALMON	..	..	..	1	1	..
COHO SALMON	..	..	..	..	..	4
LONG NOSE LANCETFISH	..	..	..	..	..	..
SKILFISH	..	1	..	..	..	..
PACIFIC BONITO	..	..	..	..	..	..
OCEAN SUNFISH	..	..	..	..	..	..
UNIDENT. FISH	..	..	..	..	..	..
SELACHI						
BLUE SHARK	210	300	88	410	110	1010
SALMON SHARK	18	12	16	18	10	6
THRESHER SHARK	..	..	..	..	..	..
BONITO SHARK	..	..	..	..	..	..
PELAGIC STINGRAY	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	1	1	..	..	..	..
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
FUR SEAL	..	..	..	..	..	..
STENELLA SP	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	4	4	12	23	6	5
STORM PETRELS	1	..	..	1	..	..
TERNS	..	..	..	..	..	..
CASSIN'S AUKLET	..	1	1	1	..	..
ALBATROSS	..	..	..	..	..	..
RHINOCEROS AUKLET	..	..	..	..	..	..
COMMON MURRE	..	..	..	..	..	..

Table 4a (cont'd)

SET NO.	43	44	45	46	47	48
DATE	JULY 29	JULY 30	JULY 31	AUG. 1	AUG. 2	AUG. 3
TIME START (LST)	1800	1815	1830	1840	1755	2230
DURATION(HR.MIN)	10.15	10.15	10.00	10.20	10.15	8.00
START N. LAT. (DEG)	48	48	48	48	48	48
(MIN)	13.0	9.4	31.2	14.5	14.9	16.0
W. LONG. (DEG)	130	130	131	132	133	133
(MIN)	36.2	58.7	4.4	10.6	31.5	8.0
DIRECTION (DEG.TRUE)	090	280	090	270	090	090
FINISH N. LAT. (DEG)	48	48	48	48	48	48
(MIN)	8.5	12.1	31.1	15.1	14.8	16.0
W.LONG. (DEG)	130	131	130	132	132	132
(MIN)	34.2	33.9	22.2	52.8	44.0	44.4
LENGTH OF SET KM.	56.0	49.0	49.0	49.0	49.0	28.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	14.4	14.4	15.1	15.0	14.8	14.6
END TEMP.(DEG.C)	14.4	14.3	14.9	14.5	15.0	14.8
NO. OF GROUPS.	8	7	7	7	7	4
TOTAL SQUID (KG)	20000	11162	14666	16762	33714	19581

Table 4a (cont'd)

SET NO.	43	44	45	46	47	48
DATE	JULY 29	JULY 30	JULY 31	AUG. 1	AUG. 2	AUG. 3
TOTAL CATCH PIECES	10250*	11407*	9837*	10287*	18391*	10048*
TOTAL CATCH WEIGHT	36741*	30662*	33264*	30365*	49475*	27277*
INVERTEBRATES						
FLYING SQUID	8688	4520	5672	7650	13955	8220
PELAGIC OCTOPUS	..	..	..	..	..	..
UNIDENT. SQUID	..	..	..	..	..	..
FISH						
POMFRET	512*	4923*	2393*	769*	2393*	683*
JACK MACKEREL	16*	8*	..	24*	291*	75*
ALBACORE	..	2	..	5	12	18
STEELHEAD	3	5	8	2	4	2
CHUM SALMON	2	..	..	..	..	..
SOCKEYE SALMON	1	..	..	..	..	..
YELLOWTAIL	..	..	..	..	5	..
PELAGIC ARMOURHEAD	..	..	5	..	..	..
PINK SALMON	1	..	..	..	..	..
COHO SALMON	1	1	1	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
SKILFISH	..	..	..	..	..	..
PACIFIC BONITO	..	..	..	..	..	..
OCEAN SUNFISH	..	..	..	..	..	..
UNIDENT. FISH	..	..	..	..	..	..
SELACHI						
BLUE SHARK	1000	1940	1720	1800	1700	1010
SALMON SHARK	16	..	26	26	21	18
THRESHER SHARK	..	1	..	..	..	..
BONITO SHARK	..	..	..	..	..	..
PELAGIC STINGRAY	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	..	..	1	..	..	..
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
FUR SEAL	..	..	..	..	..	..
STENELLA SP	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	8	7	8	9	10	20
STORM PETRELS	..	..	..	..	..	..
TERNS	1	..	2	2	..	2
CASSIN'S AUKLET	1	..	..	..	..	..
ALBATROSS	..	..	1	..	..	..
RHINOCEROS AUKLET	..	..	..	..	..	..
COMMON MURRE	..	..	..	..	..	..

Table 4a (cont'd)

SET NO.	49	50	51	52	53	54
DATE	AUG. 4	AUG. 5	AUG. 6	AUG. 7	AUG. 10	AUG. 11
TIME START (LST)	1700	1915	2035	1730	1730	1940
DURATION(HR.MIN)	11.00	10.15	7.25	10.30	10.40	9.30
START N. LAT. (DEG)	48	48	48	49	48	48
(MIN)	13.5	12.7	40.1	3.9	56.0	55.7
W. LONG. (DEG)	132	133	133	133	131	131
(MIN)	46.8	10.9	16.8	31.1	44.3	32.6
DIRECTION (DEG.TRUE)	095	095	110	110	110	100
FINISH N. LAT. (DEG)	48	48	48	48	48	48
(MIN)	9.7	9.1	37.1	54.6	44.3	49.8
W.LONG. (DEG)	132	133	132	133	131	130
(MIN)	51.1	10.3	53.1	0.2	7.0	54.6
LENGTH OF SET KM.	49.0	42.0	28.0	42.0	56.0	49.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	14.8	14.7	14.0	14.0	13.9	13.8
END TEMP.(DEG.C)	14.6	14.8	14.4	14.4	14.4	14.4
NO. OF GROUPS.	7	6	4	6	8	7
TOTAL SQUID (KG)	30781	11428	8457	7886	27276	45695

Table 4a (cont'd)

SET NO.	49	50	51	52	53	54
DATE	AUG. 4	AUG. 5	AUG. 6	AUG. 7	AUG. 10	AUG. 11
TOTAL CATCH PIECES	15156*	17588*	5147*	4176*	13515*	21079*
TOTAL CATCH WEIGHT	39332*	46569*	14633*	13197*	38286*	50110
INVERTEBRATES						
FLYING SQUID	12984	4559	3472	2670	10893	20000
PELAGIC OCTOPUS	..	..	..	..	..	..
UNIDENT. SQUID	..	..	..	..	..	..
FISH						
POMFRET	897*	10461*	769*	897*	380*	290*
JACK MACKEREL	129*	166*	158*	83*	16*	45*
ALBACORE	17	20	11	11	37	43
STEELHEAD	..	..	..	2	3	..
CHUM SALMON	..	..	..	..	..	..
SOCKEYE SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	1	..	..	..
PELAGIC ARMOURHEAD	..	..	..	..	..	..
PINK SALMON	..	..	..	..	..	..
COHO SALMON	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
SKILFISH	..	..	..	..	..	..
PACIFIC BONITO	..	1	1	..	..	..
OCEAN SUNFISH	..	..	..	..	..	..
UNIDENT. FISH	..	..	..	..	..	..
SELACHI						
BLUE SHARK	1100	2340	710	480	2140	680
SALMON SHARK	26	23	11	18	36	21
THRESHER SHARK	..	..	..	..	..	..
BONITO SHARK	..	..	..	..	4	..
PELAGIC STINGRAY	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	..	..	..	..	1	..
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
FUR SEAL	..	..	..	..	..	..
STENELLA SP	..	..	..	..	1	..
BIRDS						
SOOTY SHEARWATER	3	18	14	15	..	..
STORM PETRELS	..	..	..	..	..	..
TERNS	..	..	..	..	2	..
CASSIN'S AUKLET	..	..	..	..	2	..
ALBATROSS	..	..	..	..	..	..
RHINOCEROS AUKLET	..	..	..	..	..	..
COMMON MURRE	..	..	..	..	..	..

Table 4a (cont'd)

SET NO.	55	56	57	58	59	60
DATE	AUG. 13	AUG. 14	AUG. 15	AUG. 16	AUG. 17	AUG. 18
TIME START (LST)	1830	1750	1845	1810	1855	1930
DURATION(HR.MIN)	10.00	10.40	10.15	10.40	10.35	10.00
START N. LAT. (DEG)	49	49	49	49	49	49
(MIN)	2.3	26.6	30.4	38.4	40.0	48.3
W. LONG. (DEG)	131	131	131	131	131	132
(MIN)	21.1	32.8	30.5	42.5	24.4	0.0
DIRECTION (DEG.TRUE)	110	110	115	105	285	100
FINISH N. LAT. (DEG)	48	49	49	49	49	49
(MIN)	56.0	17.1	21.8	31.7	44.6	44.3
W.LONG. (DEG)	131	130	130	131	131	131
(MIN)	0.0	58.0	52.5	2.6	56.8	26.8
LENGTH OF SET KM.	35.0	49.0	49.0	49.0	42.0	42.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	14.3	14.4	14.3	14.6	14.3	14.4
END TEMP.(DEG.C)	14.4	14.4	13.8	13.9	14.3	14.3
NO. OF GROUPS.	5	7	7	7	6	6
TOTAL SQUID (KG)	11238	28800	17828	34019	38209	36380

Table 4a (cont'd)

SET NO.	55	56	57	58	59	60
DATE	AUG. 13	AUG. 14	AUG. 15	AUG. 16	AUG. 17	AUG. 18
TOTAL CATCH PIECES	4923*	13911*	10515*	16555*	17804*	18371*
TOTAL CATCH WEIGHT	14175*	36171*	46211*	42587*	48736*	49636*
INVERTEBRATES						
FLYING SQUID	4126	11846	7087	14427	16304	15852
PELAGIC OCTOPUS	..	..	..	..	..	..
UNIDENT. SQUID	..	..	..	..	..	..
FISH						
POMFRET	470*	982*	269*	431*	641*	982*
JACK MACKEREL	16*	..	..	..	..	..
ALBACORE	17	66	215	54	24	10
STEELHEAD	1	3	4	3	..	..
CHUM SALMON	..	3	3	..	3	1
SOCKEYE SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	..	..	..	..
PELAGIC ARMOURHEAD	..	..	..	..	..	..
PINK SALMON	..	..	..	..	..	..
COHO SALMON	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
SKILFISH	..	..	..	..	..	..
PACIFIC BONITO	..	..	..	..	..	..
OCEAN SUNFISH	..	..	..	..	..	..
UNIDENT. FISH	..	..	..	..	1	..
SELACHI						
BLUE SHARK	280	980	2895	1610	800	1500
SALMON SHARK	12	23	30	28	30	20
THRESHER SHARK	..	..	..	..	..	..
BONITO SHARK	..	..	..	..	..	..
PELAGIC STINGRAY	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	..	..	..	..	..	..
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
FUR SEAL	..	..	..	..	..	..
STENELLA SP	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	..	5	9	1	..	6
STORM PETRELS	..	..	..	..	..	..
TERNS	..	2	3	1	..	..
CASSIN'S AUKLET	1	1	..	..	1	..
ALBATROSS	..	..	..	..	..	..
RHINOCEROS AUKLET	..	..	..	..	..	..
COMMON MURRE	..	..	..	..	..	..

Table 4a (cont'd)

SET NO.	61	62	63	64	65	66
DATE	AUG. 19	AUG. 20	AUG. 21	AUG. 22	AUG. 23	AUG. 24
TIME START (LST)	1825	1735	1725	1725	1740	1725
DURATION(HR.MIN)	10.50	10.55	11.05	11.20	11.20	11.35
START N. LAT. (DEG)	49	49	49	50	50	50
(MIN)	49.3	52.0	54.6	1.9	17.8	20.9
W. LONG. (DEG)	131	132	132	132	132	132
(MIN)	32.6	12.9	1.3	31.3	33.4	25.7
DIRECTION (DEG.TRUE)	100	100	280	100	100	280
FINISH N. LAT. (DEG)	49	49	49	49	50	50
(MIN)	53.8	47.1	59.4	56.6	13.2	24.9
W.LONG. (DEG)	132	131	132	131	131	132
(MIN)	4.5	34.4	38.6	53.8	58.2	59.3
LENGTH OF SET KM.	42.0	49.0	49.0	49.0	49.0	49.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	14.5	14.6	14.7	14.9	15.1	15.3
END TEMP.(DEG.C)	14.3	14.5	14.6	15.2	15.0	14.4
NO. OF GROUPS.	6	7	7	7	7	7
TOTAL SQUID (KG)	17904	19314	27771	5295	8388	10361

Table 4a (cont'd)

SET NO.	61	62	63	64	65	66
DATE	AUG. 19	AUG. 20	AUG. 21	AUG. 22	AUG. 23	AUG. 24
TOTAL CATCH PIECES	9449*	11058*	13724*	2901*	4706*	5689*
TOTAL CATCH WEIGHT	28789*	32039*	40732	11015	15290*	16297*
INVERTEBRATES						
FLYING SQUID	7176	8419	11581	1854	3834	4102
PELAGIC OCTOPUS	..	..	..	..	..	..
UNIDENT. SQUID	..	..	..	..	..	..
FISH						
POMFRET	811*	982*	769*	346*	769*	897*
JACK MACKEREL	..	..	..	..	..	..
ALBACORE	32	27	55	59	10	1
STEELHEAD	2	3	..	..	..	..
CHUM SALMON	3	1	..	..	2	..
SOCKEYE SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	1	..	..	..
PELAGIC ARMOURHEAD	..	..	..	..	..	..
PINK SALMON	..	..	..	..	..	..
COHO SALMON	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
SKILFISH	..	..	..	..	..	..
PACIFIC BONITO	..	..	..	..	..	..
OCEAN SUNFISH	..	..	..	..	..	..
UNIDENT. FISH	..	..	..	..	..	..
SELACHI						
BLUE SHARK	1400	1600	1300	630	76	670
SALMON SHARK	18	21	18	12	14	16
THRESHER SHARK	1	1	..	..	..	..
BONITO SHARK	..	..	..	..	..	..
PELAGIC STINGRAY	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	..	..	..	..	1	..
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
FUR SEAL	..	..	..	..	..	..
STENELLA SP	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	5	..	..	..	..	2
STORM PETRELS	..	..	..	..	..	..
TERNS	1	4	..	..	..	..
CASSIN'S AUKLET	..	..	..	..	..	1
ALBATROSS	..	..	..	..	..	..
RHINOCEROS AUKLET	..	..	..	..	..	..
COMMON MURRE	..	..	..	..	..	..

Table 4b. Bridge log and jig catch information for each night's fishing by the TOMI MARU NO.88 in 1987.

SET NO.	1	2	3	4	5	6
DATE	JUNE 15	JUNE 16	JUNE 17	JUNE 18	JUNE 20	JUNE 21
TIME START (LST)	2130	2040	2220	2200	2330	2130
DURATION(HR.MIN)	4.00	3.00	3.40	3.50	1.15	4.30
START N. LAT. (DEG)	42	41	42	43	45	45
(MIN)	21.6	37.8	57.1	32.0	2.1	12.2
W. LONG. (DEG)	131	130	131	130	129	129
(MIN)	7.4	36.3	26.8	10.0	53.8	31.8
FINISH N. LAT. (DEG)	42	41	42	43	45	45
(MIN)	22.3	38.7	54.8	32.0	2.1	12.2
W.LONG. (DEG)	131	130	131	130	129	129
(MIN)	6.6	35.4	27.1	10.0	53.8	31.8
DEPTH (M)	100	100	100	100	100	100
SEE FIGURE NO.	2	2	2	2	2	2
START TEMP.(DEG.C)	14.0	14.4	14.0	14.6	13.0	13.1
END TEMP.(DEG.C)	14.0	14.3	14.0	14.6	13.0	13.1
NO. OF JIGS/LINE	26	26	26	26	26	26
NO. OF LINES	4	6	4	6	4	4
TOTAL SQUID (KG)	0	0	2	0	0	55

Table 4b (cont'd)

SET NO.	1	2	3	4	5	6
DATE	JUNE 15	JUNE 16	JUNE 17	JUNE 18	JUNE 20	JUNE 21
TOTAL CATCH PIECES	..	..	1	..	..	31
TOTAL CATCH WEIGHT	..	..	2	..	..	55
INVERTEBRATES FLYING SQUID	..	..	1	..	..	31

Table 4b (cont'd)

SET NO.	7	8	9	10	11	12
DATE	JUNE 22	JUNE 23	JUNE 24	JUNE 25	JUNE 27	JULY 1
TIME START (LST)	2130	2320	2330	2300	2300	0000
DURATION(HR.MIN)	4.40	2.40	2.00	2.00	2.00	1.00
START N. LAT. (DEG)	45	45	45	45	46	46
(MIN)	13.3	15.8	35.0	14.0	10.0	18.0
W. LONG. (DEG)	130	129	129	129	131	131
(MIN)	1.9	48.2	43.0	49.0	2.0	27.0
FINISH N. LAT. (DEG)	45	45	45	45	46	46
(MIN)	13.3	15.8	35.0	14.0	10.0	18.0
W.LONG. (DEG)	130	129	129	129	131	131
(MIN)	1.9	48.2	43.0	49.0	2.0	27.0
DEPTH (M)	100	100	100	100	100	100
SEE FIGURE NO.	2	2	2	2	2	2
START TEMP.(DEG.C)	12.6	13.6	14.0	13.5	13.0	12.7
END TEMP.(DEG.C)	12.6	13.6	14.0	13.5	13.0	12.7
NO. OF JIGS/LINE	26	26	26	26	26	26
NO. OF LINES	2	2	4	4	2	2
TOTAL SQUID (KG)	3	0	0	0	0	0

Table 4b (cont'd)

SET NO.	7	8	9	10	11	12
DATE	JUNE 22	JUNE 23	JUNE 24	JUNE 25	JUNE 27	JULY 1
TOTAL CATCH PIECES	2	..	..	..	..	..
TOTAL CATCH WEIGHT	3	..	..	..	..	..
INVERTEBRATES						
FLYING SQUID	2	..	..	..	..	..

Table 4b (cont'd)

SET NO.	13	14	15	16	17	18
DATE	JULY 1	JULY 2	JULY 4	JULY 4	JULY 9	JULY 19
TIME START (LST)	2300	2300	2300	2300	2300	2230
DURATION(HR.MIN)	2.00	2.00	2.00	2.00	2.00	2.30
START N. LAT. (DEG)	46	46	46	46	47	47
(MIN)	26.0	28.0	34.0	34.0	20.0	29.0
W. LONG. (DEG)	130	130	129	129	129	129
(MIN)	14.0	0.2	53.0	53.0	24.0	42.0
FINISH N. LAT. (DEG)	46	46	46	46	47	47
(MIN)	26.0	28.0	34.0	34.0	20.0	29.0
W.LONG. (DEG)	130	130	129	129	129	129
(MIN)	14.0	0.2	53.0	53.0	24.0	42.0
DEPTH (M)	100	100	100	100	100	100
SEE FIGURE NO.	2	2	2	2	2	2
START TEMP.(DEG.C)	12.9	12.7	13.1	13.1	13.3	13.6
END TEMP.(DEG.C)	12.9	12.7	13.1	13.1	13.3	13.6
NO. OF JIGS/LINE	26	26	26	26	26	26
NO. OF LINES	3	3	3	2	3	2
TOTAL SQUID (KG)	0	10	0	0	0	0

Table 4b (cont'd)

SET NO.	13	14	15	16	17	18
DATE	JULY 1	JULY 2	JULY 4	JULY 4	JULY 9	JULY 19
TOTAL CATCH PIECES	..	5	..	..	..	..
TOTAL CATCH WEIGHT	..	10	..	..	..	..
INVERTEBRATES						
FLYING SQUID	..	5	..	..	..	..

Table 4b (cont'd)

SET NO.	19
DATE	JULY 23
TIME START (LST)	2200
DURATION(HR.MIN)	3.00
START N. LAT. (DEG)	47
(MIN)	39.0
W. LONG. (DEG)	128
(MIN)	41.0
FINISH N. LAT. (DEG)	47
(MIN)	39.0
W.LONG. (DEG)	128
(MIN)	41.0
DEPTH (M)	100
SEE FIGURE NO.	2
START TEMP.(DEG.C)	14.6
END TEMP.(DEG.C)	14.6
NO. OF JIGS/LINE	26
NO. OF LINES	2
TOTAL SQUID (KG)	1

Table 4b (cont'd)

SET NO.	19
DATE	JULY 23
TOTAL CATCH PIECES	1
TOTAL CATCH WEIGHT	1
INVERTEBRATES	
FLYING SQUID	1

Table 4c. Bridge log and drift net catch information, in pieces, for each night's fishing by the OCEAN PEARL in 1987. * = estimate, LST = Local Standard Time.

SET NO.	1	2	3	4	5	6
DATE	JUNE 13	JUNE 14	JUNE 15	JUNE 16	JUNE 17	JUNE 18
TIME START (LST)	2125	2030	1805	1910	1835	1820
DURATION(HR.MIN)	6.35	6.20	8.55	7.50	8.25	8.40
START N. LAT. (DEG)	43	41	41	41	41	41
(MIN)	48.5	57.1	3.9	6.7	45.5	51.8
W. LONG. (DEG)	129	129	130	130	130	129
(MIN)	25.5	29.1	27.6	9.2	6.7	15.7
DIRECTION (DEG.TRUE)	270	270	285	090	270	270
FINISH N. LAT. (DEG)	43	41	41	41	41	41
(MIN)	47.5	58.7	4.5	6.2	53.6	54.1
W.LONG. (DEG)	129	129	130	129	130	129
(MIN)	37.1	44.4	50.4	45.7	6.7	39.4
LENGTH OF SET KM.	16.0	21.5	32.5	32.5	27.0	32.5
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	14.0	14.3	14.8	15.4	15.4	15.5
END TEMP.(DEG.C)	13.7	14.6	15.1	15.4	15.0	15.7
NO. OF GROUPS.	3	4	6	6	5	6
TOTAL SQUID (KG)	680	820	980	420	40	620

Table 4c (cont'd)

SET NO.	1	2	3	4	5	6
DATE	JUNE 13	JUNE 14	JUNE 15	JUNE 16	JUNE 17	JUNE 18
TOTAL CATCH PIECES	453	882	1112	905	473	1027
TOTAL CATCH WEIGHT	892	1600	2132	1427	1030*	2057*
INVERTEBRATES						
FLYING SQUID	295	355	425	180	20	265
PELAGIC OCTOPUS	..	..	..	..	3	1
NAIL SQUID	..	..	..	..	..	..
FISH						
POMFRET	65	208	120	68	10	6
JACK MACKEREL	3	19	167	56	16	31
SOCKEYE SALMON	..	..	..	..	..	..
ALBACORE	..	..	..	..	..	..
STEELHEAD	..	..	..	..	..	..
CHUM SALMON	..	..	..	..	..	..
PINK SALMON	..	..	..	..	..	..
PELAGIC ARMOURHEAD	..	..	..	..	..	..
CHUB MACKEREL	4	..	..	..	..	..
SAURY	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
ROUGH POMFRET	..	..	..	..	..	..
SKILFISH	..	..	..	..	..	..
COHO SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	..	..	..	..
SELACHI						
BLUE SHARK	84	300	400	600	420	720
SALMON SHARK	2	..	..	1	3	2
THRESHER SHARK	..	..	..	..	..	..
BASKING SHARK	..	..	..	..	..	..
SOUPFIN SHARK	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	..	..	..	..	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	1	..
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
STELLAR SEA LION	..	..	..	..	..	..
HARBOUR PORPOISE	..	..	..	..	..	1
PILOT WHALE	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	..	..	..	..	..	1
CASSIN'S AUKLET	..	..	..	..	..	..
ALBATROSS	..	..	..	..	..	..
MURRES,AUKLETS,PUFFINS	..	..	..	..	..	..
TERNS	..	..	..	..	..	..
SL.-BILL. SHEARWATER	..	..	..	..	..	..
STORM PETRELS	..	..	..	..	..	..

Table 4c (cont'd)

SET NO.	7	8	9	10	11	12
DATE	JUNE 19	JUNE 20	JUNE 22	JUNE 22	JUNE 23	JUNE 24
TIME START (LST)	1805	1830	0005	1755	1805	1705
DURATION(HR.MIN)	7.55	8.20	2.55	9.05	8.50	10.50
START N. LAT. (DEG)	42	41	43	45	45	45
(MIN)	9.0	47.1	43.2	9.3	22.0	25.1
W. LONG. (DEG)	129	129	129	130	130	130
(MIN)	14.9	9.4	59.2	22.5	40.6	27.0
DIRECTION (DEG.TRUE)	270	345	090	270	090	090
FINISH N. LAT. (DEG)	42	42	43	45	45	45
(MIN)	15.0	4.1	42.9	9.5	22.7	25.6
W.LONG. (DEG)	129	129	130	130	130	130
(MIN)	29.9	12.3	3.1	46.0	16.0	1.6
LENGTH OF SET KM.	27.5	32.5	5.2	32.5	32.4	32.3
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	14.6	14.7	13.6	13.7	13.2	15.4
END TEMP.(DEG.C)	14.9	14.6	13.6	13.7	14.6	15.0
NO. OF GROUPS.	5	6	1	6	6	6
TOTAL SQUID (KG)	880	1400	15	8950	7530	7740

Table 4c (cont'd)

SET NO.	7	8	9	10	11	12
DATE	JUNE 19	JUNE 20	JUNE 22	JUNE 22	JUNE 23	JUNE 24
TOTAL CATCH PIECES	826	1228	26	4388	3531	4440
TOTAL CATCH WEIGHT	1710*	3407*	86	10628*	10857*	11421*
INVERTEBRATES						
FLYING SQUID	380	605	8	3890	3270	3360
PELAGIC OCTOPUS	..	..	..	..	..	..
NAIL SQUID	..	..	..	..	..	..
FISH						
POMFRET	12	14	1	4	11	300
JACK MACKEREL	121	272	..	4	4	2
SOCKEYE SALMON	..	..	..	..	..	..
ALBACORE	..	..	..	..	..	..
STEELHEAD	..	1	..	1	1	..
CHUM SALMON	..	..	..	..	..	1
PINK SALMON	..	..	..	..	..	..
PELAGIC ARMOURHEAD	..	..	..	1	..	..
CHUB MACKEREL	..	..	..	..	..	..
SAURY	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
ROUGH POMFRET	..	..	..	..	..	1
SKILFISH	..	..	..	..	..	..
COHO SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	..	..	..	..
SELACHI						
BLUE SHARK	310	330	17	486	240	770
SALMON SHARK	2	4	..	1	4	2
THRESHER SHARK	..	1	..	..	..	..
BASKING SHARK	..	..	..	..	..	..
SOUPFIN SHARK	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	..	..	..	..	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	..	2
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
STELLAR SEA LION	..	..	..	..	..	..
HARBOUR PORPOISE	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	1	..
BIRDS						
SOOTY SHEARWATER	..	1	..	1	..	2
CASSIN'S AUKLET	..	..	..	..	..	..
ALBATROSS	1	..	..	..	..	..
MURRES,AUKLETS,PUFFINS	..	..	..	..	..	..
TERNS	..	..	..	..	..	..
SL.-BILL. SHEARWATER	..	..	..	..	..	..
STORM PETRELS	..	..	..	..	..	..

Table 4c (cont'd)

SET NO.	13	14	15	16	17	18
DATE	JUNE 25	JUNE 26	JUNE 27	JUNE 28	JUNE 29	JUNE 30
TIME START (LST)	1820	1900	1810	1850	1755	1730
DURATION(HR.MIN)	8.45	8.00	8.45	8.15	9.10	9.25
START N. LAT. (DEG)	45	46	46	46	46	46
(MIN)	40.4	41.8	51.1	49.4	42.6	34.7
W. LONG. (DEG)	130	130	130	130	130	130
(MIN)	30.3	58.8	57.8	35.5	54.5	57.7
DIRECTION (DEG.TRUE)	270	270	090	090	090	080
FINISH N. LAT. (DEG)	45	46	46	46	46	46
(MIN)	40.1	41.9	51.1	50.4	44.2	37.6
W.LONG. (DEG)	130	131	130	130	130	130
(MIN)	55.6	10.4	33.6	13.2	35.9	35.4
LENGTH OF SET KM.	32.1	15.6	32.1	29.1	24.2	30.9
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	14.0	13.5	13.1	13.2	13.4	13.6
END TEMP.(DEG.C)	13.8	13.4	13.6	13.0	13.2	13.3
NO. OF GROUPS.	6	3	6	6	5	6
TOTAL SQUID (KG)	5320	3060	3810	6590	7490	9410

Table 4c (cont'd)

SET NO.	13	14	15	16	17	18
DATE	JUNE 25	JUNE 26	JUNE 27	JUNE 28	JUNE 29	JUNE 30
TOTAL CATCH PIECES	2704	1883	2421	4312	4103	5339
TOTAL CATCH WEIGHT	6739*	3891	5353*	9560*	9086*	13690*
INVERTEBRATES						
FLYING SQUID	2310	1325	1655	2860	3250	4090
PELAGIC OCTOPUS	..	..	..	..	..	..
NAIL SQUID	..	..	..	..	..	..
FISH						
POMFRET	175	510	550	1150	680	1150
JACK MACKEREL	1	..	1	..	..	..
SOCKEYE SALMON	..	1	3	2	2	..
ALBACORE	..	..	..	..	..	..
STEELHEAD	..	2	4	2	1	1
CHUM SALMON	1	1	4	2	2	..
PINK SALMON	..	..	..	..	..	..
PELAGIC ARMOURHEAD	..	..	..	..	..	..
CHUB MACKEREL	..	..	..	..	..	..
SAURY	..	..	2	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
ROUGH POMFRET	..	..	..	..	..	..
SKILFISH	1	..	..	..	..	..
COHO SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	..	..	..	..
SELACHI						
BLUE SHARK	205	42	190	285	160	90
SALMON SHARK	9	2	5	9	6	4
THRESHER SHARK	..	..	..	..	..	..
BASKING SHARK	..	..	..	..	..	1
SOUPFIN SHARK	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	1	..	..	1	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	..	..
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
STELLAR SEA LION	..	..	..	..	..	..
HARBOUR PORPOISE	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	..	..	6	1	1	..
CASSIN'S AUKLET	1	..	1	..	..	2
ALBATROSS	..	..	..	..	..	..
MURRES,AUKLETS,PUFFINS	..	..	..	..	..	..
TERNS	..	..	..	..	..	..
SL.-BILL. SHEARWATER	..	..	..	..	..	1
STORM PETRELS	..	..	..	..	1	..

Table 4c (cont'd)

SET NO.	19	20	21	22	23	24
DATE	JULY 1	JULY 2	JULY 3	JULY 4	JULY 5	JULY 6
TIME START (LST)	1810	1935	1800	1625	1905	2015
DURATION(HR.MIN)	8.50	6.30	7.30	10.35	7.55	6.45
START N. LAT. (DEG)	46	46	46	46	46	46
(MIN)	36.8	40.3	47.1	39.1	37.2	36.5
W. LONG. (DEG)	130	130	130	130	130	130
(MIN)	43.3	38.3	30.2	36.2	26.2	21.1
DIRECTION (DEG.TRUE)	090	090	090	090	090	090
FINISH N. LAT. (DEG)	46	46	46	46	46	46
(MIN)	38.2	40.9	47.1	39.2	37.7	36.8
W.LONG. (DEG)	130	130	130	130	130	129
(MIN)	19.2	19.1	15.3	11.7	0.8	56.9
LENGTH OF SET KM.	29.0	23.8	20.0	29.3	29.3	29.2
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	13.3	13.7	13.3	13.5	13.7	13.6
END TEMP.(DEG.C)	13.2	13.6	13.2	13.4	13.7	13.6
NO. OF GROUPS.	6	5	4	6	6	6
TOTAL SQUID (KG)	20660	14610	15730	11145	14240	4015

Table 4c (cont'd)

SET NO.	19	20	21	22	23	24
DATE	JULY 1	JULY 2	JULY 3	JULY 4	JULY 5	JULY 6
TOTAL CATCH PIECES	9816	6466	7336	5214	6464	2149
TOTAL CATCH WEIGHT	21976	14988*	16925*	12590*	15192*	5362*
INVERTEBRATES						
FLYING SQUID	8980	6350	6835	4845	6190	1745
PELAGIC OCTOPUS	..	..	..	..	..	..
NAIL SQUID	..	..	..	..	..	..
FISH						
POMFRET	740	47	430	270	195	185
JACK MACKEREL	2	3	..	2	3	163
SOCKEYE SALMON	..	..	1	2	..	..
ALBACORE	..	..	..	..	..	..
STEELHEAD	1	..	3	1	1	1
CHUM SALMON	..	1	..	5	3	1
PINK SALMON	..	..	..	..	1	..
PELAGIC ARMOURHEAD	..	..	..	1	..	..
CHUB MACKEREL	..	..	..	..	..	..
SAURY	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	2	..	..	..	..
ROUGH POMFRET	..	..	..	..	..	..
SKILFISH	..	..	..	..	..	..
COHO SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	..	..	..	..
SELACHI						
BLUE SHARK	90	57	48	73	62	48
SALMON SHARK	3	5	5	4	1	1
THRESHER SHARK	..	..	..	..	..	..
BASKING SHARK	..	..	..	..	..	..
SOUPFIN SHARK	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	..	..	2	2	2	1
P.WH.-SIDED DOLPHIN	..	..	..	..	1	1
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
STELLAR SEA LION	..	..	..	1	..	..
HARBOUR PORPOISE	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	..	1	11	8	4	3
CASSIN'S AUKLET	..	..	1	..	..	..
ALBATROSS	..	..	..	..	1	..
MURRES,AUKLETS,PUFFINS	..	..	..	..	..	..
TERNS	..	..	..	..	..	..
SL.-BILL. SHEARWATER	..	..	..	..	..	..
STORM PETRELS	..	..	..	..	..	..

Table 4c (cont'd)

SET NO.	25	26	27	28	29	30
DATE	JULY 7	JULY 8	JULY 9	JULY 11	JULY 14	JULY 15
TIME START (LST)	1840	1830	1805	1930	1710	2030
DURATION(HR.MIN)	8.20	8.30	8.55	7.30	9.50	6.30
START N. LAT. (DEG)	47	47	47	47	47	48
(MIN)	0.1	16.2	22.4	11.0	36.7	8.5
W. LONG. (DEG)	130	131	131	131	130	130
(MIN)	7.0	19.7	29.4	18.6	9.0	21.5
DIRECTION (DEG.TRUE)	270	090	090	270	090	270
FINISH N. LAT. (DEG)	46	47	47	47	47	48
(MIN)	58.5	17.0	18.7	10.5	36.2	8.2
W.LONG. (DEG)	130	130	131	131	129	130
(MIN)	32.1	53.1	3.3	34.1	44.7	6.5
LENGTH OF SET KM.	29.3	29.2	29.0	19.6	29.2	19.2
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	13.6	13.4	13.6	14.2	13.9	13.8
END TEMP.(DEG.C)	13.7	13.4	13.4	13.9	13.9	13.9
NO. OF GROUPS.	6	6	6	4	6	4
TOTAL SQUID (KG)	1820	7365	4350	5455	10020	2610

Table 4c (cont'd)

SET NO.	25	26	27	28	29	30
DATE	JULY 7	JULY 8	JULY 9	JULY 11	JULY 14	JULY 15
TOTAL CATCH PIECES	1281	4300	2165	2483	6696	2301
TOTAL CATCH WEIGHT	2929*	9322*	4956*	5961*	14478*	4108
INVERTEBRATES						
FLYING SQUID	790	3195	1905	2380	4360	1140
PELAGIC OCTOPUS	..	1	..	..	..	..
NAIL SQUID	..	..	..	..	..	..
FISH						
POMFRET	365	1020	190	68	1540	1020
JACK MACKEREL	24	4	..	..	750	85
SOCKEYE SALMON	..	1	..	..	2	5
ALBACORE	..	..	..	..	..	..
STEELHEAD	..	4	1	..	7	11
CHUM SALMON	5	1	1	..	4	1
PINK SALMON	..	..	..	..	..	..
PELAGIC ARMOURHEAD	..	2	..	1	..	..
CHUB MACKEREL	..	..	..	..	..	..
SAURY	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
ROUGH POMFRET	..	..	..	..	..	..
SKILFISH	..	..	..	..	..	..
COHO SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	..	..	..	..
SELACHI						
BLUE SHARK	90	64	63	27	24	36
SALMON SHARK	1	3	4	6	7	3
THRESHER SHARK	..	..	..	..	..	..
BASKING SHARK	..	..	..	..	..	..
SOUPFIN SHARK	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	2	2	..	1	1	..
P.WH.-SIDED DOLPHIN	..	2	..	..	..	..
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
STELLAR SEA LION	..	..	..	..	..	..
HARBOUR PORPOISE	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	4	1	1	..	1	..
CASSIN'S AUKLET	..	..	..	..	..	..
ALBATROSS	..	..	..	..	..	..
MURRES,AUKLETS,PUFFINS	..	..	..	..	..	..
TERNS	..	..	..	..	..	..
SL.-BILL. SHEARWATER	..	..	..	..	..	..
STORM PETRELS	..	..	..	..	..	..

Table 4c (cont'd)

SET NO.	31	32	33	34	35	36
DATE	JULY 18	JULY 19	JULY 20	JULY 21	JULY 22	JULY 23
TIME START (LST)	1820	1905	1910	1850	1705	1935
DURATION(HR.MIN)	8.45	7.55	7.50	8.05	9.55	8.25
START N. LAT. (DEG)	49	48	48	47	47	47
(MIN)	7.2	44.1	28.9	26.3	28.6	25.5
W. LONG. (DEG)	130	131	130	130	129	129
(MIN)	45.8	26.1	16.9	14.4	33.2	44.2
DIRECTION (DEG.TRUE)	110	100	100	100	100	100
FINISH N. LAT. (DEG)	49	48	48	47	47	47
(MIN)	6.7	43.1	26.0	24.7	27.0	19.3
W.LONG. (DEG)	130	131	129	129	129	129
(MIN)	26.8	2.6	53.6	49.6	9.9	23.7
LENGTH OF SET KM.	24.2	29.0	28.7	28.7	28.6	28.3
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	13.2	13.7	14.4	14.0	14.4	14.5
END TEMP.(DEG.C)	13.5	13.8	14.6	14.1	14.7	14.8
NO. OF GROUPS.	5	6	6	6	6	6
TOTAL SQUID (KG)	105	450	2070	6810	8280	2525

Table 4c (cont'd)

SET NO.	31	32	33	34	35	36
DATE	JULY 18	JULY 19	JULY 20	JULY 21	JULY 22	JULY 23
TOTAL CATCH PIECES	873	2059	2891	4507	4014	1554
TOTAL CATCH WEIGHT	2507*	3885*	4645*	9487*	9057*	3398*
INVERTEBRATES						
FLYING SQUID	45	195	900	2965	3615	1105
PELAGIC OCTOPUS	..	..	..	..	..	..
NAIL SQUID	..	..	1	..	..	..
FISH						
POMFRET	340	1750	1890	1240	280	276
JACK MACKEREL	..	..	19	165	64	115
SOCKEYE SALMON	355	..	3	1	1	3
ALBACORE	..	..	17	57	6	13
STEELHEAD	18	5	8	6	6	1
CHUM SALMON	17	..	1	1	..	..
PINK SALMON	18	..	..	..	..	..
PELAGIC ARMOURHEAD	1	..	..	..	..	..
CHUB MACKEREL	..	..	..	..	..	..
SAURY	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
ROUGH POMFRET	..	..	..	..	..	..
SKILFISH	..	..	..	..	..	..
COHO SALMON	1	..	..	..	..	..
YELLOWTAIL	..	..	..	..	..	..
SELACHI						
BLUE SHARK	65	94	48	65	34	37
SALMON SHARK	11	9	3	4	6	1
THRESHER SHARK	..	1	..	..	..	..
BASKING SHARK	..	..	..	..	..	..
SOUPFIN SHARK	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	..	5	1	1	..	..
P.WH.-SIDED DOLPHIN	2	..	..	..	..	..
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
STELLAR SEA LION	..	..	..	..	..	..
HARBOUR PORPOISE	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	..	..	..	2	2	3
CASSIN'S AUKLET	..	..	..	..	..	..
ALBATROSS	..	..	..	..	..	..
MURRES,AUKLETS,PUFFINS	..	..	..	..	..	..
TERNS	..	..	..	..	..	..
SL.-BILL. SHEARWATER	..	..	..	..	..	..
STORM PETRELS	..	..	..	..	..	..

Table 4c (cont'd)

SET NO.	37	38	39	40	41	42
DATE	JULY 24	JULY 25	JULY 26	JULY 27	JULY 28	JULY 29
TIME START (LST)	1815	1705	1900	1800	1750	1750
DURATION(HR.MIN)	8.50	10.05	8.00	9.00	9.10	9.10
START N. LAT. (DEG)	48	48	48	48	48	49
(MIN)	27.3	29.3	28.3	32.8	29.0	9.6
W. LONG. (DEG)	129	129	129	129	129	131
(MIN)	39.3	40.7	40.0	36.6	38.7	4.0
DIRECTION (DEG.TRUE)	100	095	090	090	090	110
FINISH N. LAT. (DEG)	48	48	48	48	48	49
(MIN)	26.0	29.1	28.2	32.6	29.8	6.8
W.LONG. (DEG)	129	129	129	129	139	130
(MIN)	15.0	18.7	16.4	13.2	15.9	39.8
LENGTH OF SET KM.	28.5	28.5	28.5	28.3	28.0	28.2
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	14.4	14.8	14.6	14.4	14.9	14.8
END TEMP.(DEG.C)	14.4	14.6	14.4	14.4	14.8	14.8
NO. OF GROUPS.	6	6	6	6	6	6
TOTAL SQUID (KG)	16190	9980	13820	4370	2855	3358

Table 4c (cont'd)

SET NO.	37	38	39	40	41	42
DATE	JULY 24	JULY 25	JULY 26	JULY 27	JULY 28	JULY 29
TOTAL CATCH PIECES	7949	5250	6827	3619	1895	2161
TOTAL CATCH WEIGHT	17383	12229*	16362*	7834*	5489*	5447*
INVERTEBRATES						
FLYING SQUID	7050	4340	5990	1750	1230	1450
PELAGIC OCTOPUS	..	..	..	..	..	..
NAIL SQUID	..	..	..	..	..	..
FISH						
POMFRET	825	610	440	1440	275	263
JACK MACKEREL	21	26	26	12	3	..
SOCKEYE SALMON	2	3	4	4	..	1
ALBACORE	1	1	..	..	..	..
STEELHEAD	13	13	5	8	5	9
CHUM SALMON	1	..	4	..	1	..
PINK SALMON	..	..	4	1	4	1
PELAGIC ARMOURHEAD	..	..	..	..	..	..
CHUB MACKEREL	..	..	..	..	..	..
SAURY	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
ROUGH POMFRET	..	..	..	..	..	..
SKILFISH	..	..	..	..	..	..
COHO SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	..	..	..	..
SELACHI						
BLUE SHARK	32	245	340	387	360	410
SALMON SHARK	4	3	4	10	12	25
THRESHER SHARK	..	..	1	..	..	..
BASKING SHARK	..	..	..	..	..	..
SOUPFIN SHARK	..	1	..	..	..	..
MAMMALS						
DALL PORPOISE	..	..	2	..	1	..
P.WH.-SIDED DOLPHIN	..	2	1	..	1	..
N.RT.-WHALE DOLPHIN	..	..	1	1	..	..
STELLAR SEA LION	..	..	..	..	..	..
HARBOUR PORPOISE	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	..	6	5	6	3	1
CASSIN'S AUKLET	..	..	..	..	..	..
ALBATROSS	..	..	..	..	..	1
MURRES,AUKLETS,PUFFINS	..	..	..	..	..	..
TERNS	..	..	..	..	..	..
SL.-BILL. SHEARWATER	..	..	..	..	..	..
STORM PETRELS	..	..	..	..	..	..

Table 4c (cont'd)

SET NO.	43	44	45	46	47	48
DATE	JULY 30	JULY 31	AUG. 1	AUG. 2	AUG. 3	AUG. 4
TIME START (LST)	1915	1900	1815	1805	1805	1905
DURATION(HR.MIN)	7.45	8.00	9.45	8.55	8.55	9.00
START N. LAT. (DEG)	48	48	48	48	48	48
(MIN)	19.8	19.7	22.0	23.8	20.4	19.8
W. LONG. (DEG)	130	132	132	132	132	132
(MIN)	34.5	50.0	45.8	46.3	44.3	43.2
DIRECTION (DEG.TRUE)	285	280	270	275	270	270
FINISH N. LAT. (DEG)	48	48	48	48	48	48
(MIN)	23.7	20.5	21.8	24.9	20.7	19.3
W.LONG. (DEG)	130	133	133	133	133	133
(MIN)	55.7	12.5	7.2	8.3	5.4	3.2
LENGTH OF SET KM.	28.0	27.9	27.5	28.6	28.2	27.5
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	15.0	15.2	15.2	15.4	15.4	15.4
END TEMP.(DEG.C)	15.0	15.6	15.2	15.4	15.2	15.2
NO. OF GROUPS.	6	6	6	6	6	6
TOTAL SQUID (KG)	5934	22265	21805	13365	22005	9570

Table 4c (cont'd)

SET NO.	43	44	45	46	47	48
DATE	JULY 30	JULY 31	AUG. 1	AUG. 2	AUG. 3	AUG. 4
TOTAL CATCH PIECES	4232	14385	12094	9413	12090	8339
TOTAL CATCH WEIGHT	9032*	29630*	26891*	21825*	32388*	16929*
INVERTEBRATES						
FLYING SQUID	2575	8905	8875	5570	8795	4105
PELAGIC OCTOPUS	..	..	..	..	..	..
NAIL SQUID	..	..	..	..	..	..
FISH						
POMFRET	1270	4800	2850	3210	1950	3600
JACK MACKEREL	..	570	145	235	265	145
SOCKEYE SALMON	..	..	..	..	..	..
ALBACORE	..	28	8	..	20	4
STEELHEAD	5	1	1	2	..	..
CHUM SALMON	2	..	..	1	..	2
PINK SALMON	..	..	..	..	..	..
PELAGIC ARMOURHEAD	..	..	1	..	..	..
CHUB MACKEREL	..	..	..	..	..	..
SAURY	..	..	..	..	..	..
LONG NOSE LANCETFISH	..	..	..	..	..	..
ROUGH POMFRET	..	..	..	..	..	..
SKILFISH	..	..	..	..	..	..
COHO SALMON	..	..	..	..	..	..
YELLOWTAIL	..	..	..	1	..	..
SELACHI						
BLUE SHARK	375	68	204	365	1050	475
SALMON SHARK	4	9	9	19	5	5
THRESHER SHARK	..	..	..	..	..	..
BASKING SHARK	..	..	..	..	..	..
SOUPFIN SHARK	..	..	..	..	..	..
MAMMALS						
DALL PORPOISE	1	..	..	..	..	..
P.WH.-SIDED DOLPHIN	..	..	..	..	..	..
N.RT.-WHALE DOLPHIN	..	..	..	..	..	..
STELLAR SEA LION	..	..	..	..	..	..
HARBOUR PORPOISE	..	..	..	..	..	..
PILOT WHALE	..	..	..	..	..	..
BIRDS						
SOOTY SHEARWATER	..	1	1	7	5	3
CASSIN'S AUKLET	..	..	..	1	..	..
ALBATROSS	..	1	..	..	..	..
MURRES,AUKLETS,PUFFINS	..	2	..	..	..	..
TERNS	..	..	..	2	..	..
SL.-BILL. SHEARWATER	..	..	..	..	..	..
STORM PETRELS	..	..	..	..	..	..

Table 4c (cont'd)

SET NO.	49
DATE	AUG. 5
TIME START (LST)	1835
DURATION(HR.MIN)	8.55
START N. LAT. (DEG)	48
(MIN)	16.4
W. LONG. (DEG)	133
(MIN)	18.0
DIRECTION (DEG.TRUE)	090
FINISH N. LAT. (DEG)	48
(MIN)	16.3
W.LONG. (DEG)	132
(MIN)	57.9
LENGTH OF SET KM.	27.0
DEPTH (M)	0- 10
SEE FIGURE NO.	3
START TEMP.(DEG.C)	15.0
END TEMP.(DEG.C)	15.1
NO. OF GROUPS.	3
TOTAL SQUID (KG)	3495

Table 4c (cont'd)

SET NO.	49
DATE	AUG. 5
TOTAL CATCH PIECES	10602
TOTAL CATCH WEIGHT	17454*
INVERTEBRATES	
FLYING SQUID	1525
PELAGIC OCTOPUS	..
NAIL SQUID	..
FISH	
POMFRET	8500
JACK MACKEREL	250
SOCKEYE SALMON	1
ALBACORE	4
STEELHEAD	..
CHUM SALMON	..
PINK SALMON	..
PELAGIC ARMOURHEAD	..
CHUB MACKEREL	..
SAURY	..
LONG NOSE LANCETFISH	..
ROUGH POMFRET	..
SKILFISH	..
COHO SALMON	..
YELLOWTAIL	..
SELACHI	
BLUE SHARK	310
SALMON SHARK	8
THRESHER SHARK	..
BASKING SHARK	..
SOUPFIN SHARK	..
MAMMALS	
DALL PORPOISE	..
P.WH.-SIDED DOLPHIN	..
N.RT.-WHALE DOLPHIN	..
STELLAR SEA LION	..
HARBOUR PORPOISE	..
PILOT WHALE	..
BIRDS	
SOOTY SHEARWATER	4
CASSIN'S AUKLET	..
ALBATROSS	..
MURRES,AUKLETS,PUFFINS	..
TERNS	..
SL.-BILL. SHEARWATER	..
STORM PETRELS	..

Table 5. Percentage of total catch (in pieces) by species for each vessel in 1987.

Species	Vessel	
	TOMI MARU No. 88	OCEAN PEARL
Flying Squid	79.84	70.10
Nail Squid	0.00	0.00
Pink Salmon	0.00	0.01
Chum Salmon	0.02	0.03
Coho Salmon	0.00	0.00
Sockeye Salmon	0.01	0.19
Steelhead	0.04	0.07
Bonito Shark	0.00	-
Blue Shark	6.97	5.34
Salmon Shark	0.13	0.12
Thresher Shark	0.00	0.00
Basking Shark	-	0.00
Soupfin Shark	-	0.00
Pelagic Stingray	0.00	-
Pomfret	11.79	22.18
Rough Pomfret	-	0.00
Albacore	0.16	0.08
Jack Mackerel	0.95	1.79
Chub Mackerel	-	0.00
Pacific Bonito	0.00	-
Yellowtail	0.00	0.00
Pelagic Armourhead	0.00	0.00
Skilfish	0.00	0.00
Pacific Saury	-	0.00
Longnose Lancetfish	-	0.00
Ocean Sunfish	0.00	-
Dall Porpoise	0.01	0.01
Northern Right-whale Dolphin	0.00	0.00
Pacific White-Sided Dolphin	0.00	0.01
Short-finned Pilot Whale	0.00	0.00
Harbour Porpoise	0.00	0.00
Fur Seal	0.00	-
Stellar Sea Lion	-	0.00

Table 5 (cont'd)

Species	Vessel	
	TOMI MARU No. 88	OCEAN PEARL
Albatross	0.00	0.00
Sooty Shearwater	0.06	0.05
Slender-billed Shearwater	-	0.00
Family Alcidae (unidentified)	-	0.00
Common Murre	0.00	-
Cassin's Auklette	0.00	0.00
Rhinoceros Auklette	0.00	-
Terns	0.00	0.00

Table 6. Marine mammal bycatch in the offshore squid fishery during the years 1983, 1985, 1986 and 1987. T.M. = TOMI MARU #88, Sim. = SIMSTAR, O.P. = OCEAN PEARL, L.P. = LA PORSCHE

	Number of marine mammals							
	1983		1985	1986			1987	
Species	T.M.	Sim.	T.M.	T.M.	O.P.	L.P.	T.M.	O.P.
Dall porpoise	2	1	1	19	9	5	32	26
Short-finned Pilot whale	1	-	-	-	5	-	2	1
Pacific white-sided dolphin	-	-	1	-	3	-	3	13
Harbour porpoise	2	-	-	-	-	-	-	1
Northern right-whale dolphin	-	-	-	2	1	1	7	2
Killer whale	-	-	-	-	2	-	-	-
Cuvier's beaked whale	-	-	-	1	-	-	-	-
Fur seal	-	-	1	-	-	-	1	-
Stellar sea lion	-	-	-	-	-	-	-	1
Unidentified	-	-	-	-	2	-	1	-
TOTALS	5	1	3	22	22	6	46	44
Total net fished (km)	1376.4	97.3	2475.1	3204.5	750.5	352.5	3080.0	1337.0
Average net length (km) to catch 1 mammal	275.3	97.3	825.0	145.7	34.1	58.7	67.0	30.4
Average time (days) to catch 1 mammal =	9.0	25.0	18.7	3.2	1.6	4.7	1.4	1.1

Table 7a. CPUE (pieces $10km^{-1}$) by species for the TOMI MARU NO.88 and the OCEAN PEARL in 1987. (- = no catch, 0.00 = rounded number <0.01).

Common name	CPUE (pieces $10km^{-1}$)	
	TOMI MARU NO.88	OCEAN PEARL
Flying Squid	1647.97	1108.77
Pelagic Octopus	0.02	0.04
Unidentified Squid	0.01	-
Nail Squid	0.00	0.01
Pink Salmon	0.04	0.22
Chum Salmon	0.33	0.47
Coho Salmon	0.02	0.01
Sockeye Salmon	0.15	2.97
Steelhead	0.89	1.11
Bonito Shark	0.01	-
Blue Shark	143.83	84.48
Salmon Shark	2.64	1.87
Thresher Shark	0.02	0.02
Basking Shark	-	0.01
Soupfin Shark	-	0.01
Pelagic Stingray	0.00	-
Pomfret	243.32	350.88
Rough Pomfret	-	0.01
Albacore	3.33	1.19
Jack Mackerel	19.64	28.38
Chub Mackerel	-	0.03
Pacific Bonito	0.01	-
Yellowtail	0.08	0.01
Pelagic Armourhead	0.07	0.05
Skilfish	0.01	0.01
Pacific Saury	-	0.02
Long Nose Lancetfish	0.02	0.02
Ocean Sunfish	0.00	-
Unidentified Fish	0.00	-
Dall Porpoise	0.10	0.19
Northern Right Whale Dolphin	0.02	0.02
Pacific White-Sided Dolphin	0.01	0.10
Short-finned Pilot Whale	0.01	0.01

Table 7a (cont'd)

Common name	CPUE (pieces $10km^{-1}$)	
	TOMI MARU NO.88	OCEAN PEARL
Harbour Porpoise	-	0.01
Fur Seal	0.00	-
Stellar Sea Lion	-	0.01
Unidentified mammal	0.00	-
Albatross	0.01	0.03
Sooty Shearwater	1.19	0.72
Slender-billed Shearwater	-	0.01
Storm Petrels	0.10	0.01
Cassin's Auklet	0.07	0.04
Rhinoceros Auklet	0.01	-
Common Murre	0.00	-
Murres, Murrelets, Auklets and Puffins	-	0.02
Terns	0.07	0.02

Table 7b. CPUE (pieces $10km^{-1}$ hr^{-1}) by species for the TOMI MARU NO.88 and the OCEAN PEARL in 1987. (- = no catch, 0.00 = rounded number <0.01). Includes only net caught species.

Common name	CPUE (pieces $10km^{-1}$ hr^{-1})	
	TOMI MARU NO.88	OCEAN PEARL
Flying Squid	156.29	135.71
Pelagic Octopus	0.00	0.00
Unidentified Squid	0.00	-
Nail Squid	0.00	0.00
Pink Salmon	0.00	0.03
Chum Salmon	0.03	0.06
Coho Salmon	0.00	0.00
Sockeye Salmon	0.01	0.36
Steelhead	0.08	0.14
Bonito Shark	0.00	-
Blue Shark	13.65	10.34
Salmon Shark	0.25	0.23
Thresher Shark	0.00	0.00
Basking Shark	-	0.00
Soupfin Shark	-	0.00
Pelagic Stingray	0.00	-
Pomfret	23.27	42.95
Rough Pomfret	-	0.00
Albacore	0.32	0.15
Jack Mackerel	1.86	3.47
Chub Mackerel	-	0.00
Pacific Bonito	0.00	-
Yellowtail	0.01	0.00
Pelagic Armourhead	0.01	0.01
Skilfish	0.00	0.00
Pacific Saury	-	0.00
Long Nose Lancetfish	0.00	0.00
Ocean Sunfish	0.00	-
Unidentified Fish	0.00	-
Dall Porpoise	0.01	0.02
Northern Right Whale Dolphin	0.00	0.00
Pacific White-Sided Dolphin	0.00	0.01
Short-finned Pilot Whale	0.00	0.00

Table 7b (cont'd)

Common name	CPUE (pieces $10km^{-1}$ hr^{-1})	
	TOMI MARU NO.88	OCEAN PEARL
Harbour Porpoise	-	0.00
Fur Seal	0.00	-
Stellar Sea Lion	-	0.00
Unidentified mammal	0.00	-
Albatross	0.00	0.00
Sooty Shearwater	0.11	0.09
Slender-billed Shearwater	-	0.00
Storm Petrels	0.00	0.00
Cassin's Auklet	0.01	0.00
Rhinoceros Auklet	0.00	-
Common Murre	0.00	-
Murres, Murrelets, Auklets and Puffins	-	0.00
Terns	0.01	0.00

Table 8a. CPUE (kg $10km^{-1}$) by species for the TOMI MARU NO.88 and the OCEAN PEARL in 1987. (- = no catch, 0.00 = rounded number <0.01).

Common name	CPUE (kg $10km^{-1}$)	
	TOMI MARU NO.88	OCEAN PEARL
Flying Squid	3831.41	2598.37
Pelagic Octopus	0.02	0.04
Unidentified Squid	0.01	-
Nail Squid	0.00	0.02
Pink Salmon	0.04	0.28
Chum Salmon	0.65	1.68
Coho Salmon	0.04	0.02
Sockeye Salmon	0.18	9.41
Steelhead	1.69	4.57
Bonito Shark	0.32	-
Blue Shark	790.14	353.43
Salmon Shark	76.07	42.46
Thresher Shark	2.39	4.41
Basking Shark	-	18.70
Soupfin Shark	-	0.15
Pelagic Stingray	0.01	-
Pomfret	569.60	379.36
Rough Pomfret	-	0.01
Albacore	16.30	7.87
Jack Mackerel	47.27	75.92
Chub Mackerel	-	0.06
Pacific Bonito	0.25	-
Yellowtail	0.18	0.01
Pelagic Armourhead	0.03	0.04
Skilfish	0.01	0.01
Pacific Saury	-	0.01
Long Nose Lancetfish	0.06	0.07
Ocean Sunfish	0.02	-
Unidentified Fish	0.00	-
Dall Porpoise	15.38	28.78
Northern Right Whale Dolphin	4.14	2.72
Pacific White-Sided Dolphin	1.32	13.22
Short-finned Pilot Whale	14.82	17.07
Harbour Porpoise	-	0.37

Table 8a (cont'd)

Common name	CPUE (kg 10km^{-1})	
	TOMI MARU NO.88	OCEAN PEARL
Fur Seal	0.11	-
Stellar Sea Lion	-	2.24
Unidentified mammal	0.00	-
Albatross	0.03	0.15
Sooty Shearwater	0.88	0.53
Slender-billed Shearwater	-	0.00
Storm Petrels	0.01	0.00
Cassin's Auklet	0.01	0.00
Rhinoceros Auklet	0.00	-
Common Murre	0.00	-
Murres, Murrelets, Auklets and Puffins	-	0.00
Terns	0.02	0.00

Table 8b. CPUE (kg $10km^{-1}hr^{-1}$) by species for the TOMI MARU NO.88 and the OCEAN PEARL in 1987. (- = no catch, 0.00 = rounded number <0.01).

Common name	CPUE (kg $10km^{-1}hr^{-1}$) TOMI MARU NO.88	OCEAN PEARL
Flying Squid	363.51	318.04
Pelagic Octopus	0.00	0.00
Unidentified Squid	0.00	-
Nail Squid	0.00	0.00
Pink Salmon	0.00	0.03
Chum Salmon	0.06	0.21
Coho Salmon	0.00	0.00
Sockeye Salmon	0.00	1.15
Steelhead	0.16	0.56
Bonito Shark	0.03	-
Blue Shark	74.97	43.26
Salmon Shark	7.22	5.20
Thresher Shark	0.23	0.54
Basking Shark	-	2.30
Soupfin Shark	-	0.02
Pelagic Stingray	0.00	-
Pomfret	54.04	46.43
Rough Pomfret	-	0.00
Albacore	1.55	0.96
Jack Mackerel	4.48	9.29
Chub Mackerel	-	0.01
Pacific Bonito	0.00	-
Yellowtail	0.02	0.00
Pelagic Armourhead	0.00	0.00
Skilfish	0.00	0.00
Pacific Saury	-	0.00
Long Nose Lancetfish	0.01	0.01
Ocean Sunfish	0.00	-
Unidentified Fish	0.00	-
Dall Porpoise	1.46	3.52
Northern Right Whale Dolphin	0.39	0.33
Pacific White-Sided Dolphin	0.13	1.62
Short-finned Pilot Whale	1.41	2.09

Table 8b (cont'd)

Common name	CPUE (kg $10km^{-1}hr^{-1}$)	
	TOMI MARU NO.88	OCEAN PEARL
Harbour Porpoise	-	0.05
Fur Seal	0.01	-
Stellar Sea Lion	-	0.27
Unidentified mammal	0.00	-
Albatross	0.00	0.02
Sooty Shearwater	0.08	0.10
Slender-billed Shearwater	-	0.00
Storm Petrels	0.00	0.00
Cassin's Auklet	0.00	0.00
Rhinoceros Auklet	0.00	-
Common Murre	0.00	-
Murres, Murrelets, Auklets and Puffins	-	0.00
Terns	0.00	0.00

Table 9. Comparison of CPUE (kg squid km^{-1}) between all vessels that have participated in the offshore squid fishery in recent years.

Vessel	Date	CPUE (kg squid km^{-1})	Source
TOMI MARU NO.88	June-Aug 1987	383.1	This study
OCEAN PEARL	June-Aug 1987	259.8	This study
TOMI MARU NO.88	June-Sept 1986	266.3	Jamieson and Heritage (1987)
OCEAN PEARL	July-Sept 1986	270.5	Jamieson and Heritage (1987)
LA PORSCHE	Aug-Sept 1986	153.8	Jamieson and Heritage (1987)
TOMI MARU NO.88	July-Sept 1985	311.5	Jamieson and Heritage (1987)
SIMSTAR	July-Aug 1983	339.2	Robinson and Jamieson (1984)
TOMI MARU NO.88	July-Aug 1983	232.3	Sloan (1984)
TENYU MARU NO.37	July-Aug 1980	332.0	Bernard (1981)
TOMI MARU NO.88	August 1980	165.8	Bernard (1981)

Table 10. Mean daily CPUE (pieces $10km^{-1}$) of the most commonly caught species (>1 piece $10km^{-1}$) caught with driftnets by the two vessels fishing flying squid in 1987. Data provided are averaged for sets made before and after July 24, with surface water temperatures before and after this date generally <14°C, and >14°C, respectively. $p < 0.5$ = significant difference between the two average catch rates.

	TOMI MARU #88			OCEAN PEARL		
	June 15-July 24 (n=38)	July 25-August 24 (n=28)	p	June 13-July 24 (n=37)	July 25-August 5 (n=12)	p
Flying squid	1434.1	1875.4	.08	929.0	1638.2	.03
Pomfret	219.3	293.2	.41	177.7	879.2	<.01
Jack mackerel	34.2	8.3	.14	19.8	50.2	.07
Albacore	1.4	5.7	.01	0.9	1.9	.36
Salmon (all species)	0.7	0.4	.21	5.0	1.0	.60
Steelhead	1.2	0.6	.10	1.0	1.4	.47
Blue shark	71.8	247.3	<.01	62.7	136.3	<.01
Salmon shark	1.7	4.1	<.01	1.4	3.4	<.01
Sooty shearwater	1.1	1.6	.23	0.5	1.2	.04
Dall porpoise	0.2	0.02	.01	0.2	0.1	.40

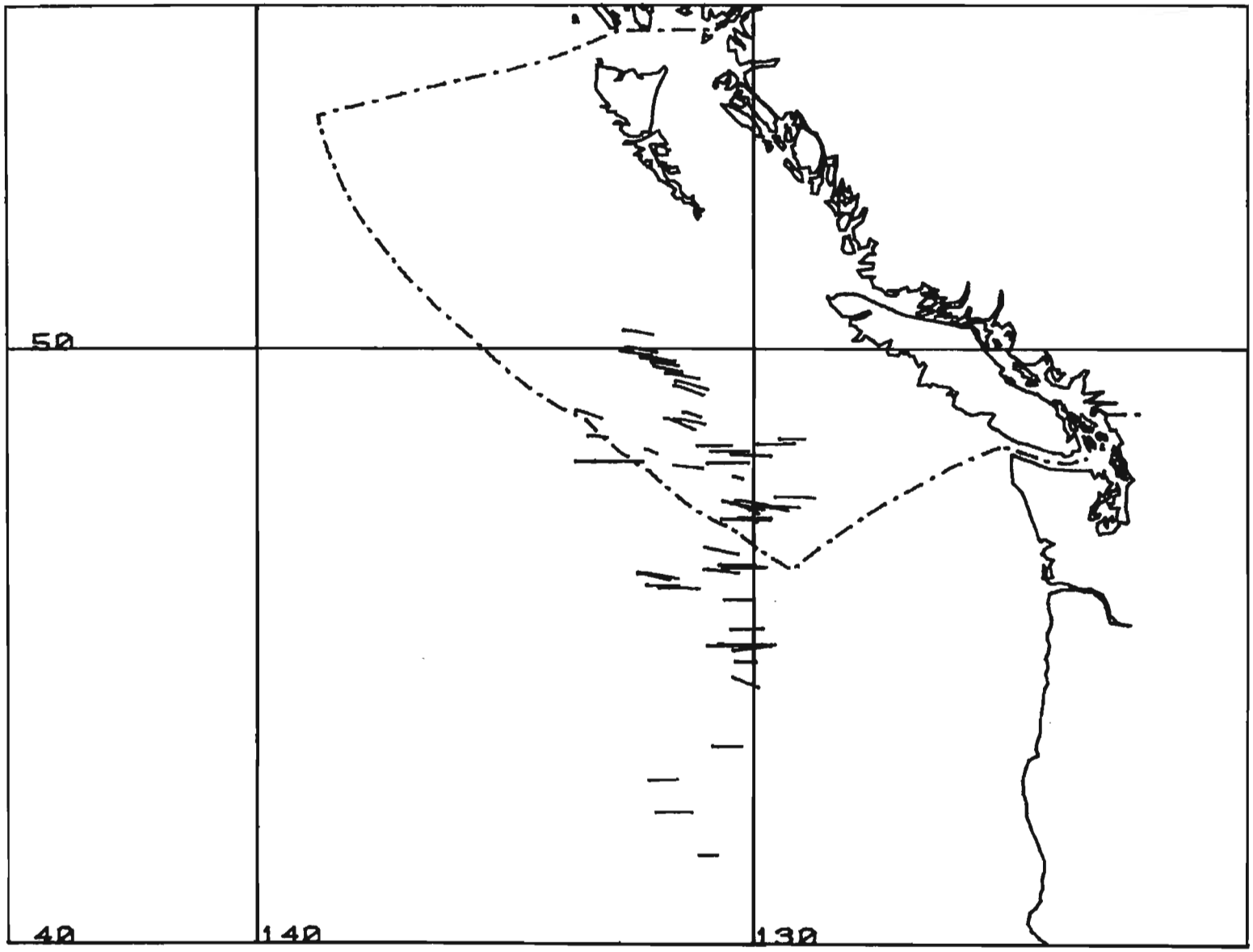

Fig. 1. 1987 driftnet set locations for TOMI MARU NO. 88.

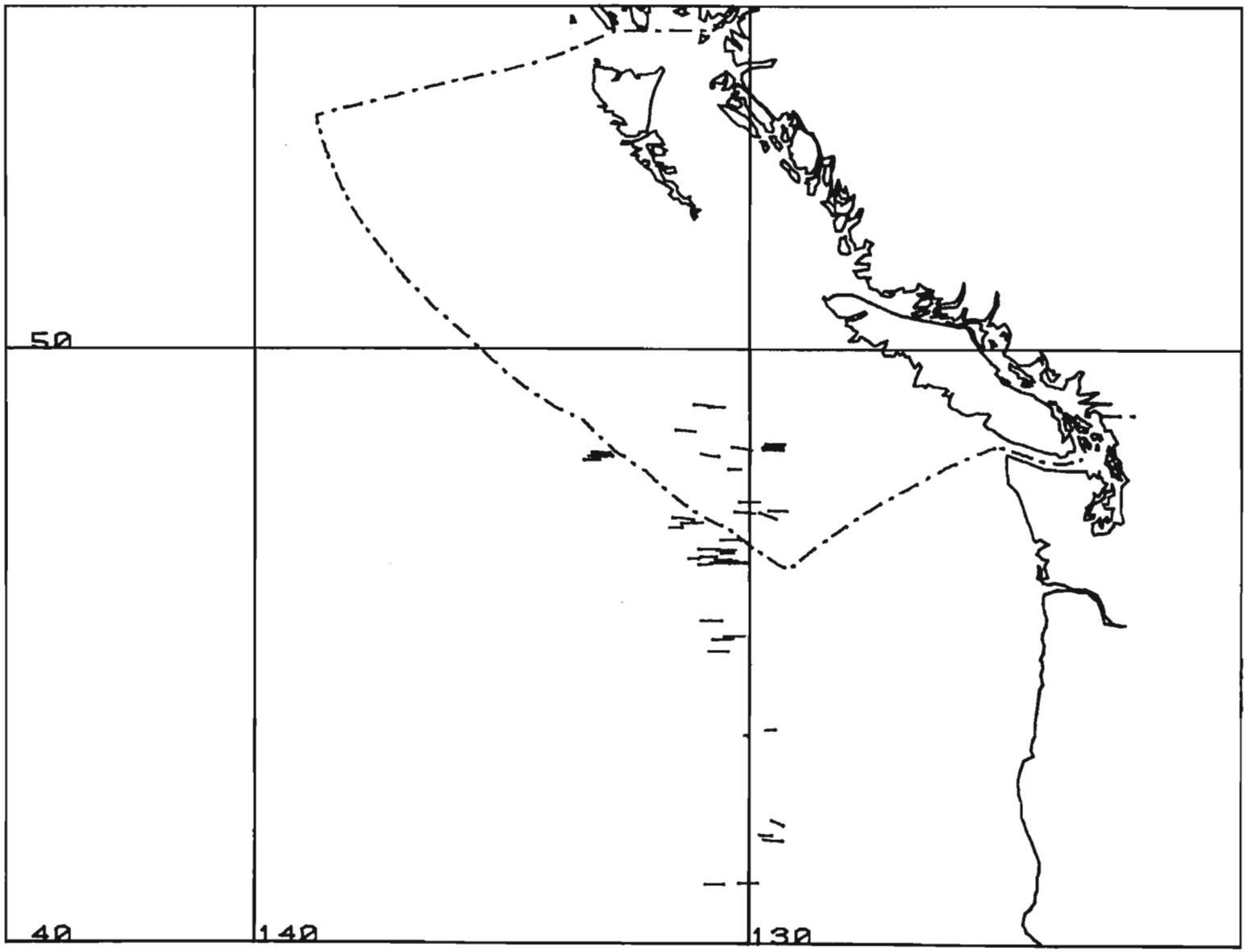

Fig. 2. 1987 driftnet set locations for OCEAN PEARL.

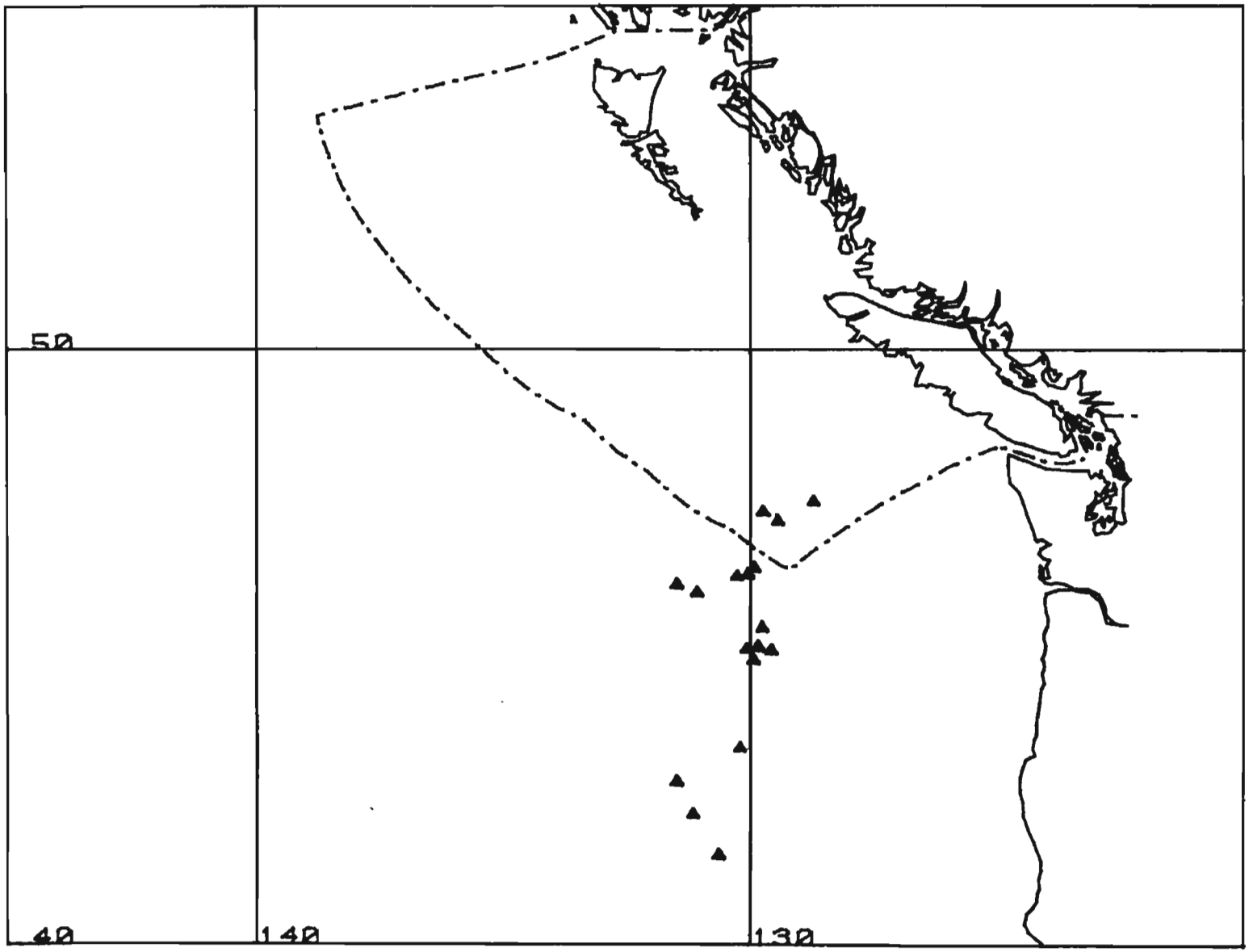

Fig. 3. 1987 jig sites for TOMI MARU NO. 88.